DRAFT NOISE STUDY REPORT

GULF COAST PARKWAY
From US 98 in Gulf County to US 231 and US 98 (Tyndall Parkway) in Bay County
Gulf, Bay and Calhoun Counties, Florida

Financial Project Number: 410981-1-14-01
Federal Project Number: None Assigned

Prepared For:
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The Gulf Coast Parkway is a proposed new four-lane divided, controlled-access, arterial highway, approximately 30 miles in length. The proposed facility would provide an urban typical section with bicycle lane and sidewalks in urban areas and a rural typical section with a multi-use trail on one side of the highway. The proposed new road would also provide a new high-level bridge across the Gulf Intracoastal Waterway (ICWW) to connect US 98 in Gulf County, Florida with US 231 and US 98 (Tyndall Parkway) in Bay County, Florida.

August 2013

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study for the development of a new highway that utilizes existing and new alignments between US 98 in Gulf County and US 231 and US 98 (Tyndall Parkway) in Bay County. The purpose of the project is to enhance economic development in the region through improved access from southeastern Bay County and coastal Gulf County to intermodal facilities in Bay County; relieve traffic congestion on existing roads, and improve emergency, and hurricane, evacuation. The project length is approximately 29 to 32 miles.

This Noise Study Report (NSR) has been prepared to determine the effect of the proposed project on traffic noise levels in the project area, in accordance with Title 23 (Code of Federal Regulations {CFR}_ Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010) as required by the Noise Control Act of 1972[1]. Specifically, the study identifies noise sensitive sites, predicts existing and future traffic noise levels at the sensitive sites identified during field review, documents predicted noise levels at the sensitive sites, and addresses noise abatement considerations for any noise sensitive site that approaches or exceeds the Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC). This analysis follows the methodology described in the FDOT PD&E Manual, Part 2, Chapter 17[2] (May 24, 2011).

In compliance with the aforementioned regulation and using existing and predicted future traffic volumes, traffic noise levels were predicted for the No Build and Build alternatives and compared to FHWA's NAC. The analysis of the No Build alternative showed that the future No Build conditions would cause traffic noise levels to exceed the NAC for one receptor. The build alternatives would generate traffic noise levels in excess of the NAC by the Design Year (2035) for up to two receptors depending on the alternative. No noise sensitive receptors were predicted to experience a substantial increase in traffic noise levels. For the Design Year (2035) No Build conditions, one receptor (29) is predicted to experience traffic noise levels that approach or exceed the NAC. In the Design Year (2035) Build conditions; Alternative 8 and 17 have two impacted receptors and Alternatives 14, 15, and 19 have one impacted receptor.

Noise barriers were found to not be feasible at the impacted receptors to abate predicted noise impacts for all of the build alternatives in the design year. The goal of achieving a 5 decibel dB (A) reduction for two impacted receptors in order for a noise barrier to be considered feasible was not met as the impacted receptors were isolated receptors.

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[1] Title 23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, Federal Highway Administration; 2011.
[2] PD&E Manual, Part 2, Chapter 17, Florida Department of Transportation; Tallahassee, Florida; May 24, 2011.

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List of Acronyms

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
AFB	Air Force Base
CFR	Code of Federal Regulation
CR	County Road
dB	decibels
dB(A)	decibels using an "A" weighting-scale
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FIHS	Florida Intrastate Highway System
GCP	Gulf Coast Parkway
ICWW	Intracoastal Waterway
IDC	Intermodal Distribution Center
LOS	Level of Service
LRTP	Long Range Transportation Plan
NAC	Noise Abatement Criteria
NSA	Noise Study Area
NSR	Noise Study Report
PD&E	Project Development and Environment
ROW	Right-Of-Way
SPL	Sound Pressure Levels
SR	State Road
TNM	Traffic Noise Model
TPO	Transportation Planning Organization

SECTION 1 INTRODUCTION

The FDOT is conducting a PD&E Study for a new highway utilizing existing and new alignments from US 98 in Gulf County to US 231 and US 98 (Tyndall Parkway) in Bay County. The project length is approximately 29 to 32 miles depending on the alternative alignment. The project area is shown in **Figure 1-1**. The project proposes to construct a four-lane highway utilizing both urban and rural typical sections within a right-of-way width that varies from 160 feet to 250 feet, minimum, depending on the typical section. In addition to the No Build alternative, five Build alternatives are being evaluated. These five alternatives were selected based on their abilities to provide added capacity while best accommodating the environmental, physical, and social characteristics of these communities. The proposed project also includes sidewalks and a multi-use path.

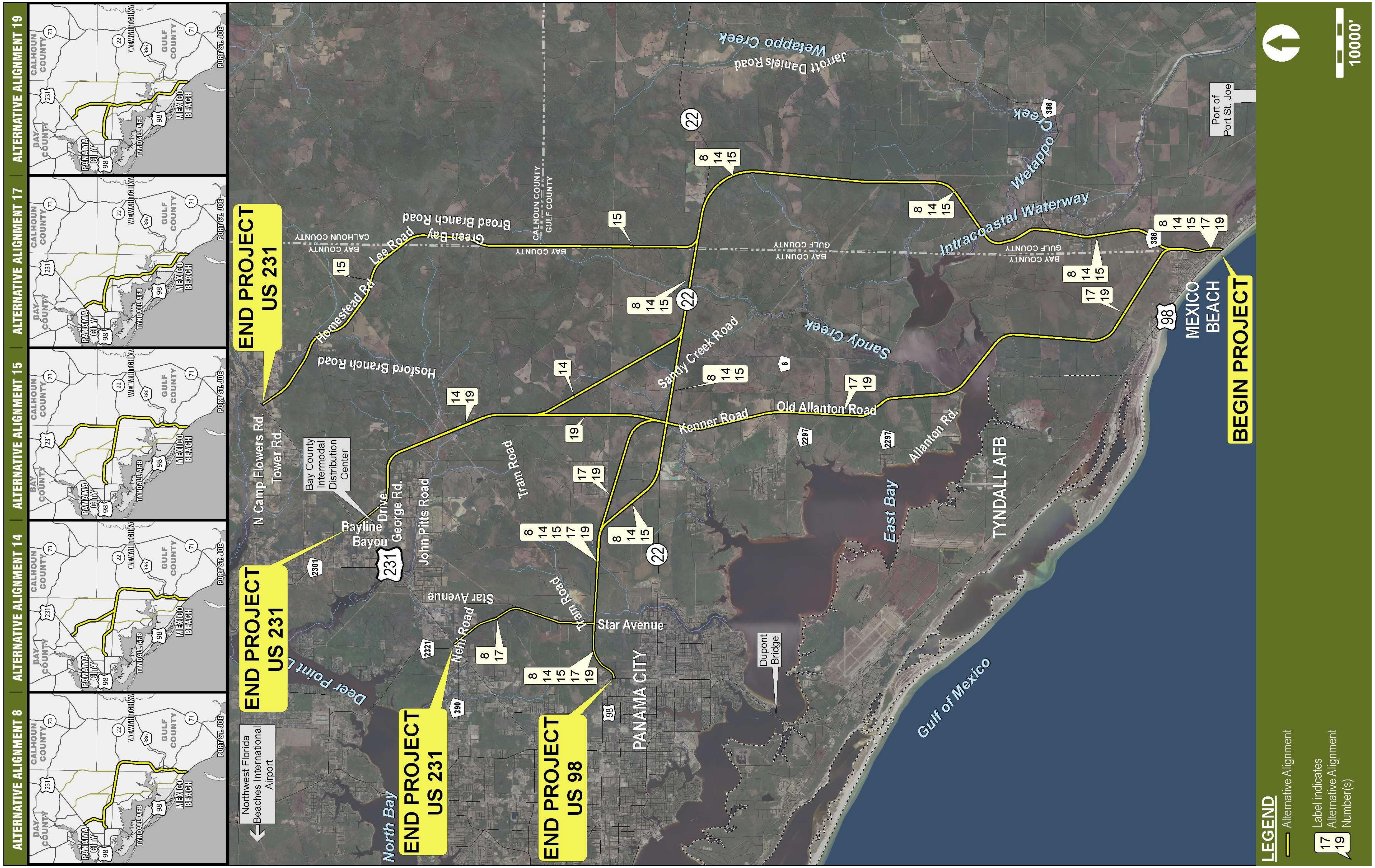
This NSR documents the analysis of predicted design year (2035) traffic noise levels for the project alternatives, including the No Build, as well as noise abatement considerations for noise sensitive sites potentially impacted by the project alternatives. This analysis has been conducted to comply with the requirements of the FDOT PD&E Manual, Part 2, Chapter 17 (May 24, 2011) and Title 23 CFR Part 772, *Procedures for the Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010).

1.1 PURPOSE

The FHWA, in cooperation with the FDOT, is considering the addition of a new link in the transportation network of the central Panhandle of Florida. This new link, known as the Gulf Coast Parkway, would provide a connection between US 98 in Gulf County and US 231 and US 98 (Tyndall Parkway) in Bay County, Florida (**Figure 1-1**). The purpose for the Gulf Coast Parkway is to:

- Enhance economic development in Gulf County through provision of direct access to major transportation facilities (regional freight transportation routes and intermodal facilities); improved mobility; and direct access to tourist destinations in south Gulf County.
- Improve mobility within the regional transportation network by providing a new connection to existing and future transportation routes consistent with the Bay County Long Range Transportation Plan (LRTP) and the Gulf County Comprehensive Plan.
- Improve security of the Tyndall Air Force Base (AFB) by providing a shorter detour route.
- Improve hurricane evacuation for residents of coastal Gulf County by providing an additional evacuation route.

Figure 1-1: Project Study Area Map



1.2 PROJECT DESCRIPTION

A No Build and five Build alternatives are being evaluated as part of the Gulf Coast Parkway PD&E study. Based on the traffic study conducted for this project, some segments of the proposed road would initially be built as a two-lane road within the right-of-way for a four-lane facility. Other segments in areas of congested traffic would be constructed as the ultimate four lane divided roadway. The proposed typical sections and the alternatives are described in more detail below.

1.2.1 Typical Section

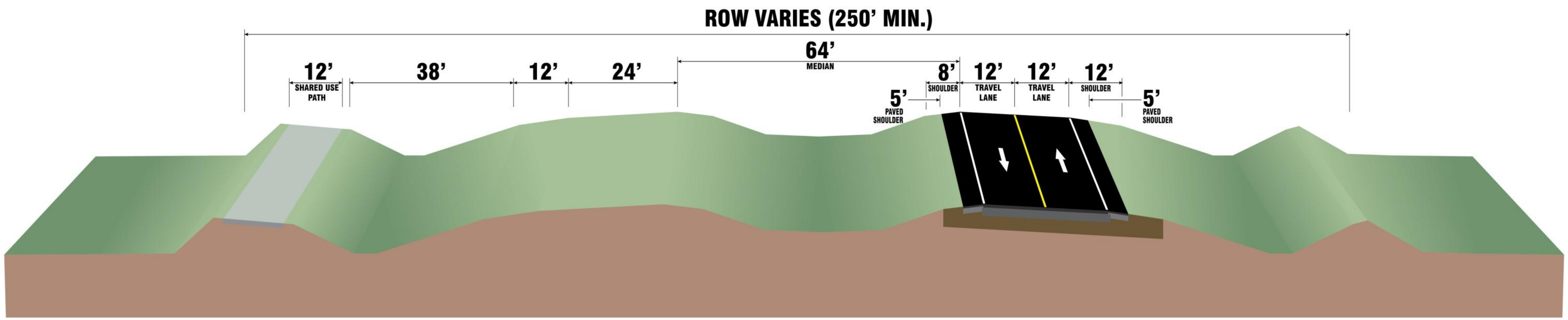
Based on the need to meet Florida Intrastate Highway System (FIHS) criteria and future traffic demand (as discussed later in this section and in the Gulf Coast Parkway Traffic Report) the ultimate proposed typical section will be a four-lane divided roadway with stormwater management and bicycle and pedestrian facilities. The project is anticipated to be constructed in segments, with the order of construction based on a variety of factors including the need for connectivity, transportation demand, and funding. In some segments the project may be initially constructed with only two 12-foot lanes with either a rural or urban typical section, depending on location; however, the right-of-way for the four lane typical section would be acquired in order to provide for needed future expansion. It should be noted that in the design year the traffic projections warrant a four-lane typical section for the length of the project. Therefore, the traffic noise study utilized the ultimate typical sections for the noise analysis.

The configuration of the ultimate typical section would be either rural or urban, depending upon the location. The interim and ultimate rural arterial typical sections are shown in **Figure 1-2.** The interim rural typical section would provide two 12-foot lanes with five-foot paved shoulders for bicycle use and a 12-foot multi-use trail offset within 250 feet of right-of-way. The ultimate rural typical section would provide four 12-foot lanes with a 5-foot outside shoulder divided by a 64-foot median and includes a 12-foot multi-use trail within 250-feet of right-of-way. The interim and ultimate urban arterial typical sections are shown in **Figure 1-3**. The interim urban typical section includes two 12-foot lanes a four foot inside shoulder and 6.5-foot outside bicycle lane and a five-foot sidewalk within 160 feet of right-of-way. The ultimate urban typical section would provide four 12-foot lanes with a four-foot inside shoulder and a 6.5 foot outside bicycle lane, separated by a 46-foot median. This is a curb and gutter section with five-foot paved sidewalks on each side of the roadway.

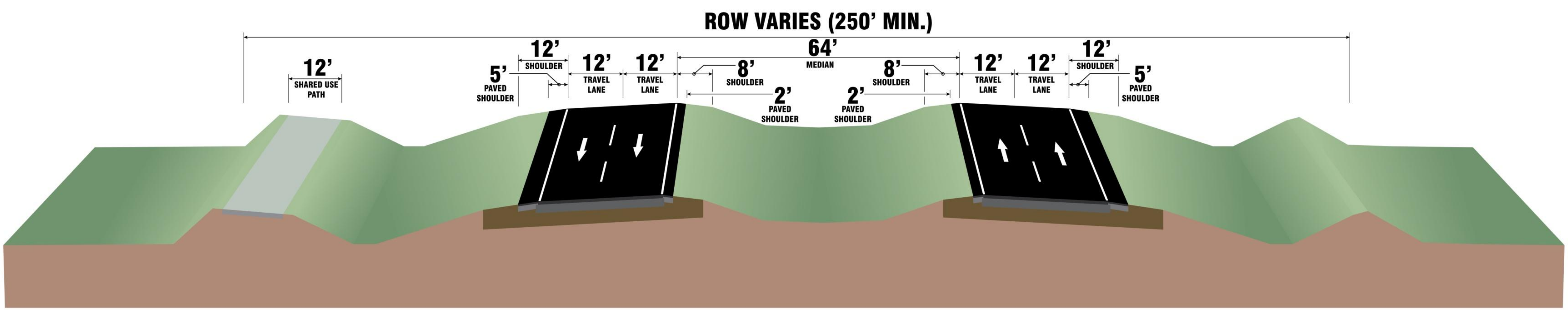
The proposed design speed is 65 mph for the rural roadway, and 50 mph for the urban roadway.

Figure 1-2: Proposed Interim and Ultimate Rural Arterial Typical Sections

Interim Rural Typical



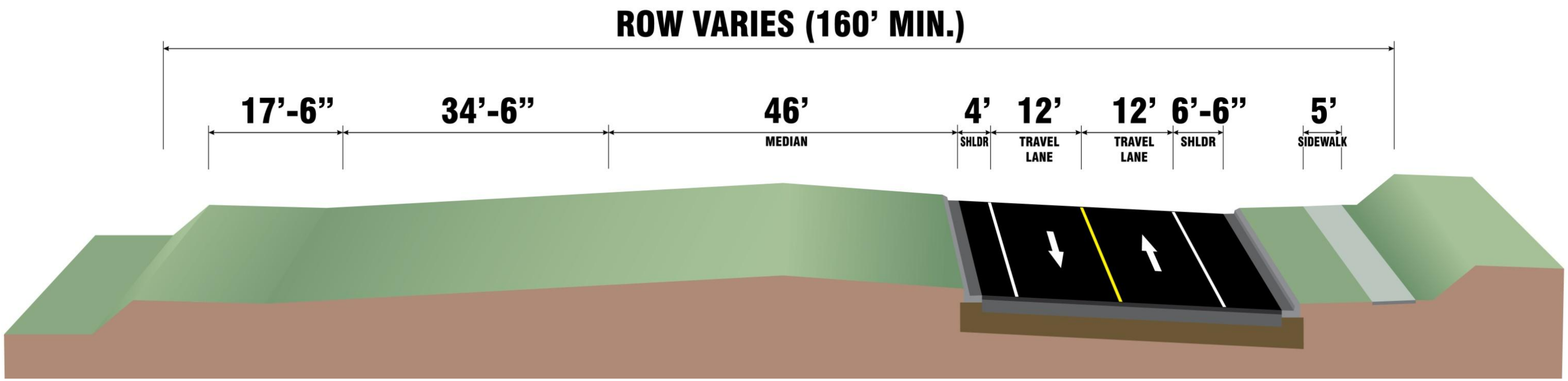
Ultimate Rural Typical



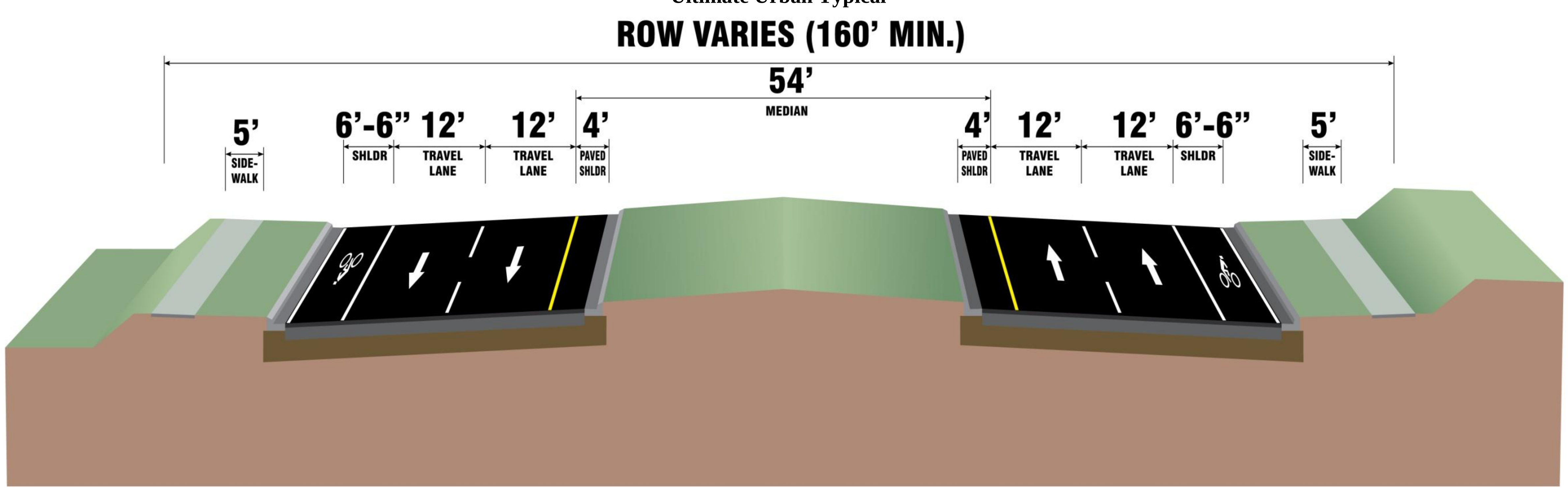
Note: ROW refers to right-of-way.

Figure 1-3: Proposed Interim and Ultimate Urban Arterial Typical Sections

Interim Urban Typical



Ultimate Urban Typical



Note: ROW refers to right-of-way.

1.2.2 Project Alternatives

Initially, 19 corridor alternatives were investigated and 14 were eliminated through the PD&E process. The remaining five build corridors are the reasonable corridors in which Build Alternatives were developed. This noise analysis will predict the traffic noise levels of the five Build alternatives and the No-Build alternative on noise sensitive sites in the study area. . The descriptions of the alternatives, shown in **Figure 1-6**, can be found below.

Alternative 8

From the intersection of US 98 and County Road (CR) 386, Alternative 8 follows CR 386 north utilizing the urban typical section to North 15th Street. From there it transitions to a rural typical section, continuing north along existing CR 386 for approximately 3 miles where it deviates from CR 386. Proceeding north on new alignment for a total of approximately 8.5 miles, Alternative 8 crosses the Intracoastal Waterway (ICWW) and Wetappo Creek on a new high-level bridge, and continues north to intersect State Road (SR) 22 approximately 11.4 miles east of Callaway. From there, the alignment travels west along existing SR 22 for approximately 6.5 miles where it turns northwest and then west on new alignment for approximately 5.0 miles to intersect Star Avenue about 0.3 mile south of Tram Road. From Star Avenue, Alternative 8 transitions to an urban typical section which is carried through to both termini locations. The alternative's through movement continues west on new alignment for approximately 0.7 mile to merge with and follow existing Tram Road for approximately 0.5 mile. It then turns west and continues on new alignment to end at a new intersection with US 98 (Tyndall Parkway). Additionally, the less dominant leg of Alternative 8 proceeds north along existing Star Ave. approximately 2.2 miles until the intersection with Nehi Road where it follows mostly along Nehi Road to the northwest to end at a new intersection with US 231 in the vicinity of the existing CR 2321/US 231 intersection.

Alternative 14

From the intersection of US 98 and CR 386, Alternative 14 follows CR 386 north utilizing the urban typical section to North 15th Street. From there it transitions to a rural typical section, continuing north along existing CR 386 for approximately 3 miles where it then deviates from CR 386 alignment. Proceeding north on new alignment for a total of approximately 8.5 miles, Alternative 14 crosses the ICWW and Wetappo Creek on a new high-level bridge, and continues north to intersect SR 22 approximately 11.4 miles east of Callaway. From there, the alignment travels west along existing SR 22 for approximately 2.5 miles where it splits. To connect with US 98 (Tyndall Parkway), the alignment continues west on SR 22 for approximately 4.0 miles where it turns northwest and then west to intersect Star Ave. about 0.3 mile south of Tram Road. From Star Ave., Alternative 14 transitions to an urban typical section and continues west 0.7 miles to merge with and follow existing Tram Road for approximately 0.5 mile. It then turns west and continues on new alignment to end at a new intersection with US 98 (Tyndall Parkway). To connect with US 231, Alternative 14 after splitting from SR 22 proceeds northwest on new alignment for approximately 8.0 miles where it turns to the west and continuing on new alignment, travels south of and parallel to the Bay County Industrial Park and Conservation Boundary. It then transitions to an urban typical section and proceeds northwest to intersect with the planned entrance roadway for the Port of Panama City Intermodal Distribution Center (IDC) which intersects with US 231.

Figure 1-4: Build Alternatives

Alternative 15

From the intersection of US 98 and CR 386, Alternative 15 follows CR 386 north utilizing the urban typical section to North 15th Street. From there it transitions to a rural typical section, continuing north along existing CR 386 for approximately 3 miles where it then deviates from the CR 386 alignment. Proceeding north, on new alignment for a total of approximately 8.5 miles, Alternative 15 crosses the ICWW and Wetappo Creek on a new high-level bridge, and continues north to intersect SR 22 approximately 11.4 miles east of Callaway. From there, Alignment 15 has two options depending on the desired terminus. To connect with US 98 (Tyndall Parkway), Alternative 15 travels west along existing SR 22 for approximately 6.5 miles where it turns northwest and then west on new alignment for approximately 5.0 miles to intersect Star Ave. about 0.3 miles south of Tram Road. From Star Ave., Alternative 15 transitions to an urban typical section and continues west on new alignment for approximately 0.7 mile to merge with and follow existing Tram Road for approximately 0.5 mile. It then turns west and continues on new alignment to end at a new intersection with US 98 (Tyndall Parkway). Alternately, from SR 22, Alternative 15 continues across SR 22, traveling north then northwest on new alignment for approximately 14.0 miles, transitioning back to an urban typical section just before it ends at a new intersection with US 231 near Camp Flowers Road.

Alternative 17

From the intersection of US 98 and CR 386, Alternative 17 follows CR 386 utilizing the urban typical section to North 15th Street. From there, it transitions to a rural typical section and continues north along existing CR 386 for approximately 0.5 mile where it then turns west and travels on new alignment for 3.0 miles. The alignment veers to the north for approximately 2.5 miles and then utilizing a new high level bridge crosses over East Bay and the ICWW. The alignment returns to grade on Allanton Point and continues to the north mostly along existing Allanton/Old Allanton Road until it reaches SR 22. After crossing SR 22, the road would travel north then west on new alignment for approximately 5.3 miles to connect at an intersection with Star Ave. about 0.3 mile south of Tram Road. From the intersection at Star Ave., Alternative 17 transitions to an urban typical section and has two termini locations. The alternative's through movement continues west on new alignment for approximately 0.7 mile until it merges with existing Tram Road. From there it travels along existing Tram Road for approximately 0.5 mile and then turns to the west on new alignment to end at a new intersection with US 98 (Tyndall Parkway). Additionally, the alternative travels north along existing Star Ave. approximately 2.2 miles until the intersection with Nehi Road where if follows mostly along Nehi Road to the northwest to end at a new intersection with US 231. FDOT's recommended alternative is Alternative 17 for the Gulf Coast Parkway project.

Alternative 19

From the intersection of US 98 and CR 386, Alternative 19 follows CR 386 utilizing the urban typical section up to North 15th Street. From there it transitions to a rural typical section and continues north along existing CR 386 for approximately 0.5 mile where it then turns west and travels on new alignment for approximately 3.0 miles. The alignment veers to the north for approximately 2.5 miles and then, utilizing a new high level bridge crosses over East Bay and the ICWW. The alignment returns to grade on Allanton Point and continues to the north mostly along existing Allanton/Old Allanton Road until it reaches SR 22. After crossing SR 22, the road has two options. One would turn west to travel on new alignment for approximately 5.0 miles to intersect with Star Ave. about 0.3 miles south of Tram Road. From the intersection at Star Ave., Alternative 19 transitions to an urban typical section, continues west 0.7 mile to merge with and follow Tram Road for approximately 0.5 mile and then turns to the west on new alignment to end at a new intersection with US 98 (Tyndall Parkway). Alternately, Alignment 19 would continue north on new alignment for approximately 6.2 miles where it turns to the west, continuing on new alignment along the south property line of the Port of Panama City IDC and its Conservation Boundary. It then transitions to an urban typical section and turns to the northwest to intersect with the planned entrance roadway for the Bay County Industrial Park which intersects with US 231.

No-Build Alternative

The No-Build Alternative would simply leave the existing roadway network in its current configuration. No capacity, intersection, pedestrian, bicycle, or safety improvements would be implemented within the corridor.

The No-Build Alternative has a number of positive attributes. No expenditure of public funds for design, right-of-way acquisition, or construction would be required. Traffic would not be disrupted due to construction, thus avoiding inconveniences to local businesses and residences. There would be no impacts to wetlands or threatened or endangered species. With the No-Build Alternative, there is no risk of contamination. No costs would be incurred due to utility relocation. There would be no direct or indirect impacts to the socioeconomic characteristics, community cohesion, or system linkage of the area.

However, the No-Build Alternative option fails to fulfill the project's purpose and need, or meet any of the Bay or Gulf County Comprehensive and LRTPs. The lack of a new roadway would not:

- Help reduce travel time for residents from southeast Bay and coastal Gulf Counties to employment centers in Panama City.
- Provide a more direct route between US 98 in Gulf County and freight transfer facilities on US 231 in Bay County.
- Improve access to Enterprise Zones in Gulf County.
- Provide a direct route for tourists traveling US 231 to reach vacation and recreation areas in south Gulf County.
- Provide a more direct route from south Gulf County to the new Northwest Florida Beaches International Airport.
- Help ease traffic congestion on the surrounding roadway network, including US 98 (Tyndall Parkway) through Bay County.
- Provide an alternative route to US 98 (Tyndall Parkway) in Bay County to US 98 in Gulf County that does not travel through Tyndall AFB.
- Provide an alternative emergency and hurricane evacuation route.

The No-Build Alternative is also inconsistent with the plans and goals of the Bay County Transportation Planning Organization (TPO). It fails to comply with the LRTP as established by the TPO.

However, the No-Build Alternative will remain a viable alternative throughout the entire length of the study along with the Build Alternatives.

SECTION 2 METHODOLOGY

This traffic noise analysis study was prepared in accordance with Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2010) using methodology established by the FDOT in the PD&E Manual, Part 2, Chapter 17 (May 24, 2011).

2.1 MODEL AND NOISE METRICS

Noise levels were predicted using the FHWA Traffic Noise Model (TNM), version 2.5. All measured and predicted noise levels are expressed in decibels (dB) using the A-weighting scale [dB(A)]. This scale most closely approximates the response characteristics of the human ear to traffic noise. Examples of common noise levels are listed in **Table 2-1**. All noise levels are reported as hourly equivalent noise levels (Leq(h), which can be compared directly to criteria levels established by FHWA. The Leq(h) is defined as the equivalent steady-state sound level that, in a given hourly period, contains the same acoustic energy as the time-varying sound for the same hourly period.

Table 2-1: Typical Noise Levels

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dB(A)	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 1000 ft		
	---100---	
Gas Lawn Mower at 3 ft		
	---90---	
Diesel Truck at 50 ft, at 50 mph		Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
	---80---	
Noise Urban Area (Daytime) Gas Lawn Mower at 100 ft Commercial Area	**---70---**	Vacuum Cleaner at 10 ft Normal Speech at 3 ft
Heavy Traffic at 300 ft	**---60---**	
Quiet Urban Daytime	**---50---**	Large Business Office Dishwasher Next Room
Quiet Urban Nighttime Quiet Suburban Nighttime	**---40---**	Theater, Large Conference Room (Background)
	---30---	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (Background)
	---20---	
	---10---	
Lowest Threshold of Human Hearing	**---0---**	Lowest Threshold of Human Hearing

Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.

2.2 TRAFFIC DATA

Traffic noise is heavily dependent on traffic speed, with the amount of noise generated by traffic increasing as the vehicle speed increases. Traffic data for year 2011 and the design year (2035) was reviewed to determine maximum traffic volumes that would allow traffic to flow at speeds consistent with established speed limits. To simulate “worst-case” conditions, Level of Service (LOS) C or demand traffic volume, whichever is less, was modeled. Traffic volumes used in the analysis are summarized in **Tables 2-2a** through **2-2e**.

Table 2-2a: Design Year Road Segment LOS: Alternative 8

Roadway	Segment	Year 2011 Average Annual Daily Traffic (AADT)	Adopted LOS Standard	LOS Maximum Volume	Functional Classification	Facility Type	Area Type	No. Of Lanes	2035 AADT	2035 LOS
	Segment 1									
US 98	East of CR 386	10000	C	14,200	Principal Arterial	Undivided	Rural Developed	2	19165	D
US 98	West of CR 386	9200	C	14,200	Principal Arterial	Undivided	Rural Developed	2	7500	B
CR 386	US 98 – 15th St.	1700	B	23,800	Principal Arterial	Divided	Rural Developed	4	13635	B
CR 386	15th St. – Gulf Coast Parkway (GCP) Segment 3	1900	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	13935	B
CR 386	GCP Segment 3 – SR 71	1500	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	2600	B
	Segments 3, 8, 10, 14, 15									
GCP, Seg. 3, 8, 10	CR 386 – SR 22	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
SR 22	East of GCP, Segment 10	2800	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	5751	C
SR 22	GCP, Segment 10 – CR 2297 (Allanton Rd.)	4300	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	18986	B
SR 22	East of GCP, Segment 15	10500	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	29586	C
SR 22	West of GCP, Segment 15	10500	C	15,100	Minor Arterial	Undivided	Transitioning to Urban	2	16659	D
GCP, Seg. 15, 17,21	North of SR 22	0	B	31,400	Principal Arterial	Divided	Transitioning to Urban	4	14386	B
	Segments 17, 21									
GCP 17, 21	SR 22 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	14386	B
Star Avenue	South of GCP (South of Tram Rd.)	7400	D	14,850	Urban Collector	Undivided	Urban	2	10036	C
GCP Seg. 25 (Tram Rd.)	West of Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
Star Avenue	North of Tram Road	8300	D	36,700	Principal Arterial	Divided	Urban	4	16143	B
	Segment 25									
Tram Road	US 98 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
US 98	South of Tram Road	35850	D	55,300	Principal Arterial	Divided	Urban	6	51000	C
US 98	North of Tram Road	31600	D	55,300	Principal Arterial	Divided	Urban	6	51200	C
14th Street	West of Tyndall Parkway (US 98)	700	D	14,850	Minor Collector	Undivided	Urban	2	1200	B
	Segment 26, 27									
GCP, Seg. 26	Tram Road – Nehi Road	8300	D	36,700	Principal Arterial	Divided	Urban	4	16143	B
Star Avenue (Seg. 28)	North of GCP, Segment 26, 27	0	D	14,850	Urban Collector	Undivided	Urban	2	6036	B
GCP, Seg. 27	Star Avenue – US 231	0	D	36,700	Principal Arterial	Divided	Urban	4	10243	B
US 231	West, Southwest of GCP, Seg. 27	25800	D	55,300	Principal Arterial	Divided	Urban	6	45085	C
US 231	East, Northeast of GCP, Seg. 27	30400	D	55,300	Principal Arterial	Divided	Urban	6	54011	D
Sources;										

Traffic from 2011 FDOT Traffic Data DVD
LOS data from FDOT Project Traffic Forecasting Handbook (2009), and
Year 2007 Gulf Co. LOS Report provided by Apalachee Regional Planning Council planning staff in September 2009
Year 2009 Bay Co. Congestion Management System Plan Report, Bay County Transportation Planning Organization, from www.wfrpc.org/bay documents accessed in September 2009
Note: Letters in **BOLD** reflect a LOS below adopted LOS standard
SR 22 is assumed to have capacity (4-lane) improvements upstream/downstream of its intersection with GCP.
The congestion management databases from Gulf and Bay Counties were used to determine adopted LOS and road class only. Actual LOS volumes were obtained from the 2009 FDOT's QLOS Handbook.

Table 2-2b: Design Year Road Segment LOS: Alternative 14

Roadway	Segment	Year 2011 AADT	Adopted LOS Standard	LOS Maximum Volume	Functional Classification	Facility Type	Area Type	No. Of Lanes	2035 AADT	2035 LOS
	Segment 1, 3									
US 98	East of CR 386	10000	C	14,200	Principal Arterial	Undivided	Rural Developed	2	19165	**D**
US 98	West of CR 386	9200	C	14,200	Principal Arterial	Undivided	Rural Developed	2	7500	B
CR 386	US 98 – 15th Street	1700	B	23,800	Principal Arterial	Divided	Rural Developed	4	13635	B
CR 386	15th Street – GCP Segment 3	1900	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	13935	B
CR 386	GCP Segment 3 – SR 71	1500	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	2600	B
	Segments 3, 8, 10, 15									
GCP, Seg. 3, 8, 10	CR 386 – SR 22	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
SR 22	East of GCP, Segment 10	2800	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	5751	C
SR 22 GCP Seg. 14	West of GCP, Segment 10	3400	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	17486	B
SR 22 GCP Seg. 15	West of GCP, Segment 30	10500	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	29586	B
SR 22	West of GCP, Segment 15	10500	D	21.100	Minor Arterial	Undivided	Transitioning to Urban	2	17250	D
GCP, Seg 15, 17, 21	North of SR 22	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	1489	B
	Segments 17, 21									
GCP Seg. 17, 21	SR 22 – Tram Road	0	D	36,700	Principal Arterial	Divided	Urban	4	14386	B
Star Avenue	South of GCP (South of Tram Rd.)	7400	D	14,850	Urban Collector	Undivided	Urban	2	10036	C
GCP Seg. 25 (Tram Rd.)	West of Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
Star Avenue	North of Tram Road	8300	D	36,700	Principal Arterial	Divided	Urban	4	16143	B
	Segment 25									
Tram Road	US 98 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
US 98	South of Tram Road	35850	D	55,300	Principal Arterial	Divided	Urban	6	51000	C
US 98	North of Tram Road	31600	D	55,300	Principal Arterial	Divided	Urban	6	51200	C
14th Street	West of Tyndall Parkway (US 98)	700	D	14,850	Minor Collector	Undivided	Urban	2	1200	B
	Segment 30, 31, 36-38									
GCP, Seg. 30, 31, 36-38	SR 22 – US 231	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	1489	B
US 231	Star Avenue to East	100	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	44296	C
US 231	US 231 (1,480 feet south of CR 388)	0	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	30523	C
Sources;										

Traffic from 2011 FDOT Traffic Data DVD
LOS data from FDOT Project Traffic Forecasting Handbook (2009), and
Year 2007 Gulf Co. LOS Report provided by Apalachee Regional Planning Council planning staff in September 2009
Year 2009 Bay Co. Congestion Management System Plan Report, Bay County Transportation Planning Organization, from www.wfrpc.org/bay documents accessed in September 2009
Note: Letters in **BOLD** reflect a LOS below adopted LOS standard
SR 22 is assumed to have capacity (4-lane) improvements upstream/downstream of its intersection with GCP.
The congestion management databases from Gulf and Bay Counties were used to determine adopted LOS and road class only. Actual LOS volumes were obtained from the 2009 FDOT's QLOS Handbook.

Table 2-2c: Design Year Road Segment LOS: Alternative 15

Roadway	Segment	Year 2011 AADT	Adopted LOS Standard	LOS Maximum Volume	Functional Classification	Facility Type	Area Type	No. Of Lanes	2035 AADT	2035 LOS
	Segment 1									
US 98	East of CR 386	10000	C	14,200	Principal Arterial	Undivided	Rural Developed	2	19165	D
US 98	West of CR 386	9200	C	14,200	Principal Arterial	Undivided	Rural Developed	2	7500	B
CR 386	US 98 – 15th Street	1700	B	23,800	Principal Arterial	Divided	Rural Developed	4	13635	B
CR 386	15th Street – GCP Segment 3	1900	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	13935	B
CR 386	GCP Segment 3 – SR 71	1500	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	2600	B
	Segments 3, 8, 10, 14, 15, 12, 40									
GCP, Seg. 3, 8, 10	CR 386 – SR 22	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
SR 22	East of GCP, Segment 10	2800	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	5751	C
SR 22- GCP Seg. 14	West of GCP, Segment 10	3400	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	17486	B
SR 22 – GCP Seg. 15	West of GCP, Segment 14	3400	C	41,100	Principal Arterial	Divided	Rural Undeveloped	4	17486	B
SR 22	West of GCP, Segment 15	10500	D	21,100	Minor Arterial	Undivided	Transitioning to Urban	2	16659	D
GCP, Seg. 12, 40	North of SR 22	100	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	1489	B
	Segments 17, 21									
GCP Seg. 17, 21	SR 22 – Tram Road	0	D	36,700	Principal Arterial	Divided	Urban	4	14386	B
Star Avenue	South of GCP (South of Tram Rd.)	7400	D	14,850	Urban Collector	Undivided	Urban	2	10036	C
GCP Seg. 25 (Tram Rd.)	West of Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
Star Avenue	North of Tram Road	8300	D	36,700	Principal Arterial	Divided	Urban	4	16143	B
	Segment 25									
Tram Road	US 98 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	**B**
US 98	South of Tram Road	35850	D	55,300	Principal Arterial	Divided	Urban	6	51000	C
US 98	North of Tram Road	31600	D	55,300	Principal Arterial	Divided	Urban	6	51200	C
14th Street	West of Tyndall Parkway (US 98)	700	D	14,850	Minor Collector	Undivided	Urban	2	1200	B
	Segment 12, 40, 41									
GCP, Seg. 40, 41	SR 22 – US 231	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	1513	B
US 231	Star Avenue to East	21000	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	29243	B
US 231	US 231 (1,480 feet south of CR 388)	20000	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	29243	B
Sources;										

Traffic from 2011 FDOT Traffic Data DVD
LOS data from FDOT Project Traffic Forecasting Handbook (2009), and
Year 2007 Gulf Co. LOS Report provided by Apalachee Regional Planning Council planning staff in September 2009
Year 2009 Bay Co. Congestion Management System Plan Report, Bay County Transportation Planning Organization, from www.wfrpc.org/bay documents accessed in September 2009
Note: Letters in **BOLD** reflect a LOS below adopted LOS standard
SR 22 is assumed to have capacity (4-lane) improvements upstream/downstream of its intersection with GCP.
The congestion management databases from Gulf and Bay Counties were used to determine adopted LOS and road class only. Actual LOS volumes were obtained from the 2009 FDOT's QLOS Handbook.

Table 2-2d: Design Year Road Segment LOS: Alternative 17

Roadway	Segment	Year 2011 AADT	Adopted LOS Standard	LOS Maximum Volume	Functional Classification	Facility Type	Area Type	No. Of Lanes	2035 AADT	2035 LOS
	Segment 2									
US 98	East of CR 386	10000	C	14,200	Principal Arterial	Undivided	Rural Developed	2	19165	D
US 98	West of CR 386	9200	C	14,200	Principal Arterial	Undivided	Rural Developed	2	7500	B
CR 386	US 98 – 15th Street	1700	B	23,800	Principal Arterial	Divided	Rural Developed	4	13635	B
CR 386	15th Street – GCP Segment 2	1900	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	13935	B
CR 386	GCP Segment 2 – SR 71	1500	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	2600	B
GCP, Seg. 2	West of CR 386	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
	Segments 16, 18, 21									
GCP, Seg. 2	CR 386 – SR 22	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
SR 22	East of GCP, Segment 2	10500	D	22,200	Minor Arterial	Undivided	Urban	2	20586	D
SR 22	West of GCP, Segment 2	10500	D	22,200	Minor Arterial	Undivided	Urban	2	16659	D
GCP Seg 16, 18,21	SR 22 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	14386	B
Star Avenue	South of GCP (South of Tram Rd.)	7400	D	14,850	Urban Collector	Undivided	Urban	2	10036	C
GCP Seg. 25 (Tram Road)	West of Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
Star Avenue (GCP Seg 26)	North of Tram Road	8300	D	36,700	Principal Arterial	Divided	Urban	4	14043	B
	Segment 25									
Tram Road	US 98 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
US 98	South of Tram Road	35850	D	55,300	Principal Arterial	Divided	Urban	6	51000	C
US 98	North of Tram Road	31600	D	55,300	Principal Arterial	Divided	Urban	6	51200	C
14th Street	West of Tyndall Parkway (US 98)	700	D	14,850	Minor Collector	Undivided	Urban	2	1200	B
	Segment 26, 27									
Star Ave. South of Seg. 27	Tram Road – Segment 27	8300	D	36,700	Principal Arterial	Divided	Urban	4	14043	B
Star Avenue	North of GCP, Segment 27	0	D	14,850	Urban Collector	Undivided	Urban	2	6036	B
GCP, Segment 27	West of Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	10243	B
US 231	West, Southwest of GCP Seg 27	25800	D	55,300	Principal Arterial	Divided	Urban	6	45085	C
US 231	East, Northeast of GCP Seg. 27	30400	D	55,300	Principal Arterial	Divided	Urban	6	54011	D
Sources;										

Traffic from 2011 FDOT Traffic Data DVD

LOS data from FDOT Project Traffic Forecasting Handbook (2009), and

Year 2007 Gulf Co. LOS Report provided by Apalachee Regional Planning Council planning staff in September 2009

Year 2009 Bay Co. Congestion Management System Plan Report, Bay County Transportation Planning Organization, from www.wfrpc.org/bay documents accessed in September 2009

Note: Letters in **BOLD** reflect a LOS below adopted LOS standard

SR 22 is assumed to have capacity (4-lane) improvements upstream/downstream of its intersection with GCP.

The congestion management databases from Gulf and Bay Counties were used to determine adopted LOS and road class only. Actual LOS volumes were obtained from the 2009 FDOT's QLOS Handbook.

Table 2-2e: Design Year Road Segment LOS: Alternative 19

Roadway	Segment	Year 2011 AADT	Adopted LOS Standard	LOS Maximum Volume	Functional Classification	Facility Type	Area Type	No. Of Lanes	2035 AADT	2035 LOS
	Segment 2									
US 98	East of CR 386	10000	C	14,200	Principal Arterial	Undivided	Rural Developed	2	19165	D
US 98	West of CR 386	9200	C	14,200	Principal Arterial	Undivided	Rural Developed	2	7500	B
CR 386	US 98 – 15th Street	1700	B	23,800	Principal Arterial	Divided	Rural Developed	4	13635	B
CR 386	15th Street – GCP Segment 2	1900	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	13935	B
CR 386	GCP Segment 2 – SR 71	1500	C	8,100	Minor Arterial	Undivided	Rural Undeveloped	2	2600	B
GCP, Seg. 2	West of CR 386	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
	Segments 16, 18, 21									
GCP, Seg. 2	CR 386 – SR 22	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	10735	B
SR 22	East of GCP, Segment 2	10500	D	22,200	Minor Arterial	Undivided	Urban	2	20586	D
SR 22	West of GCP, Segment 2	10500	D	22,200	Minor Arterial	Undivided	Urban	2	16659	D
GCP Seg 16, 18,21	SR 22 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	13986	B
Star Avenue	South of GCP (South of Tram Rd.)	7400	D	14,850	Urban Collector	Undivided	Urban	2	10036	**C**
GCP Seg. 25 (Tram Road)	West of Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	B
Star Avenue (GCP Seg 26)	North of Tram Road	8300	D	36,700	Principal Arterial	Divided	Urban	4	14043	B
	Segment 25									
Tram Road	US 98 – Star Avenue	0	D	36,700	Principal Arterial	Divided	Urban	4	12443	**B**
US 98	South of Tram Road	35850	D	55,300	Principal Arterial	Divided	Urban	6	51000	C
US 98	North of Tram Road	31600	D	55,300	Principal Arterial	Divided	Urban	6	51200	C
14th Street	West of Tyndall Parkway (US 98)	700	D	14,850	Minor Collector	Undivided	Urban	2	1200	B
	Segment 29, 34, 36-38									
GCP Seg. 29, 34, 36-38	GCP Seg. 16 - US 231	0	B	26,300	Principal Arterial	Divided	Rural Undeveloped	4	1513	B
US 231	Star Avenue to the East	21000	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	33425	C
US 231	US 231 (1,480" south of CR 388)	20000	C	45,400	Principal Arterial	Divided	Transitioning to Urban	4	29243	B
Sources;										

Traffic from 2011 FDOT Traffic Data DVD
LOS data from FDOT Project Traffic Forecasting Handbook (2009), and
Year 2007 Gulf Co. LOS Report provided by Apalachee Regional Planning Council planning staff in September 2009
Year 2009 Bay Co. Congestion Management System Plan Report, Bay County Transportation Planning Organization, from www.wfrpc.org/bay documents accessed in September 2009
Note: Letters in **BOLD** reflect a LOS below adopted LOS standard
SR 22 is assumed to have capacity (4-lane) improvements upstream/downstream of its intersection with GCP.
The congestion management databases from Gulf and Bay Counties were used to determine adopted LOS and road class only. Actual LOS volumes were obtained from the 2009 FDOT's QLOS Handbook.

A peak hour factor (K-factor) of 9.00 percent and a directional factor (D-factor) of 52.8 to 62.7 percent were used to reduce the Average Daily Traffic (ADT) volumes to hourly directional volumes. The hourly volumes were divided into three vehicle classifications (i.e., cars, medium trucks, and heavy trucks). All roadway segments utilized a medium truck split which varied from 2.59 to 4.88 percent and a heavy truck split which varied from 3.78 to 10.03 percent of the hourly vehicle volume respectively. Future traffic predictions within the traffic demand model cannot be made for buses and motorcycles so they were omitted from the future analysis. The traffic data used for this report can be found in **Appendix A**.

2.3 ALTERNATIVES EVALUATED AND DETERMINATION OF NOISE LEVELS

The project alternatives that were evaluated have been presented in **Section 1.2.2** and include the No Build Alternative and Build Alternatives 8, 14, 15, 17, and 19. Existing noise levels were measured in the field and used establish background noise levels and to verify that the TNM Version 2.5 noise prediction model would accurately predict noise levels. Upon validation, the model was used to predict traffic noise levels for existing (2011) and future (2035) traffic volumes under the No Build and Build alternatives conditions. The predicted noise levels for each alternative were compared to the FHWA Noise Abatement Criteria (NAC) for the land use category in which the receptors were located. Those noise sensitive receptors that experienced noise levels that approached or exceeded the NAC, or had predicted noise levels substantially greater than existing noise levels were considered impacted by the traffic noise. Impacted receptors were analyzed to determine the feasibility and cost-effectiveness of providing noise abatement as part of the project. This process is explained in greater detail below.

2.3.1 Existing Conditions and Model Validation

Noise levels were measured at various locations (designated as Monitoring Sites 1-7 in **Appendix B**) in the project corridor to verify that the model was computing accurate noise levels and to establish background noise levels. The existing roadway alignment and traffic counts and speeds observed during the monitoring sessions were entered into TNM. The results of the model were compared with the measured noise levels. If the modeled and measured noise levels were within 3 dB(A) of each other, the model was considered accurate and met FDOT requirements. A 3 dB(A) tolerance was used because a person with average hearing would need at least a 3 dB(A) change in noise level to notice a difference in overall loudness.

The comparison of predicted and measured noise levels was conducted at all monitoring locations within the corridor with exception to the ambient noise monitoring sites (Sites 3, 5, and 6).

Because observed traffic volumes and speeds were used for the model validation, modeled values may differ from the typical peak-hour, existing conditions noise modeling described later in this report.

2.3.2 Noise Abatement Criteria

The FHWA has established noise levels at which noise abatement must be considered for various categories of noise sensitive sites. These noise levels are referred to as the NAC. As shown in **Table 2-3**, the NAC vary according to the activity category.

Table 2-3: FHWA Noise Abatement Criteria

Activity Category	Leq(h)	Description of Land Use Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Residential
C	67 (Exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, schools, and television studios.
E	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	Undeveloped lands that are not permitted.

Source: 23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, FHWA, 2011.

Noise abatement measures are considered when predicted traffic noise levels for design year Build conditions approach or exceed the NAC. The FDOT defines “approach” as within 1 dB(A) of the FHWA criteria. Noise abatement must also be considered when a substantial increase in traffic noise will occur as a direct result of the transportation project. The FDOT defines a substantial increase as an increase of 15 or more dB(A) above the existing noise level as a direct result of the transportation improvement project in question.

2.3.3 Noise Prediction

As discussed in **Section 2.2**, traffic volumes for existing (2011) and future (2035) years were evaluated to determine whether peak–hour traffic volumes or LOS C volumes should be used to predict traffic noise levels. The traffic volumes utilized in the noise analysis were those that would provide the greatest noise levels based on vehicle speed. All measured and predicted noise levels are expressed in dB using the A-weighting scale dB(A)[dB(A)] and are reported as hourly equivalent noise levels Leq(h), which can be compared directly to NAC established by FHWA. The Leq(h) is defined as the equivalent steady-state sound level that, in a given hourly period, contains the same acoustic energy as the time-varying sound for the same hourly period.

2.3.4 Noise Abatement

Those receptors for which the predicted noise levels approached or exceeded the FHWA NAC criteria or experience a substantial increase from existing levels were considered for feasible and reasonable noise abatement, including noise barriers. Feasibility deals primarily with engineering considerations such as meeting minimum noise reduction requirements or whether there would be a negative effect on property access. Reasonableness is a cost benefit analysis based on the amount of noise reduction achieved for the cost expended.

Noise barriers reduce noise levels by blocking the sound path between a roadway and a noise sensitive site. To effectively reduce traffic noise, a noise barrier must be relatively long, continuous (with no intermittent openings) and of sufficient height.

For a noise barrier to be considered feasible and reasonable, the following minimum conditions should be met:

- To be considered feasible, a noise barrier must provide at least a five dB(A) reduction at two or more impacted receptors with a seven dB(A) reduction at one or more receptors. Constructability of a barrier using standard construction methods and techniques should also be considered.

- Reasonableness of a noise barrier consists of the cost effectiveness and whether it attains the FDOT's reduction design goal of 7 dB(A) for one or more of the benefited receptors. Cost reasonableness is expressed as $42,000 per benefited receptor. The cost of the noise barrier should not exceed $42,000 per benefited noise sensitive site. This is the reasonable cost limit established by the FDOT. A benefited noise receptor is defined as a receptor that would experience at least a five dB(A) reduction as a result of providing a noise barrier. The current unit cost used to evaluate economic reasonableness is $30 per square foot, which covers barrier materials and labor.

After determining the amount of noise reduction and cost, other factors such as community desires, adjacent land uses, land use stability, antiquity, predicted noise level increases, safety considerations, drainage issues, utility conflicts, maintenance requirements, and construction issues may also be considered when evaluating the feasibility and reasonableness of providing noise barriers.

SECTION 3 NOISE SENSITIVE SITES

A noise receptor is a discrete or representative location of a noise sensitive site for any of the land use categories listed in FHWA's NAC (**Table 2-3**). All of the receptors in this report represent Activity Categories B, C, or F.

3.1 NOISE SENSITIVE AREAS

Noise-sensitive areas may be identified by individual land uses, or by broad categories of land use for which a single NAC criterion level may apply. In some cases, lands that are undeveloped at the time of the noise study may be known to be under consideration for development in the future. Future developments are classified into two categories, planned and permitted. Permitted developments in the project area were analyzed in this report.

The existing land use in the study area (**Figure 3-1**) is a mix of primarily *Agriculture*, *Conservation/Preservation/Recreation*, and *Residential* with some *Commercial and/or Industrial* along the major highways (Tyndall Parkway and US 231). The land uses identified as Conservation/Preservation/Recreation and Commercial and/or Industrial use did not include any areas of frequent human use. Noise sensitive areas adjacent to the Build alternatives are shown in **Figure 3-2** and described below. Not all noise sensitive areas are adjacent to all alternatives. **Table 3-1** summarizes which Noise Study Area (NSAs) are associated with a particular alternative.

Agriculture is classified under Activity Category F but there are no noise abatement criteria for this category.

3.1.1 Mexico Beach Area

The Mexico Beach area around the US 98/CR 386 intersection consists of a mix of commercial/industrial and residential uses. There is only one commercial development and approximately 13 residences adjacent to CR 386 between US 98 and 1st Street. Seven of these family residences were evaluated as noise sensitive receptors. They are adjacent to the proposed build alternatives and are representative receptors of the Mexico Beach community.

There is a residential neighborhood of approximately 20 single family homes north of Mexico Beach. The neighborhood is accessed by La Siesta Drive from CR 386. There are three lots adjacent to CR 386, but only two have houses and the third lot is a permitted residence. All three of these were analyzed as noise sensitive receptors.

Figure 3-1: Existing Land Use

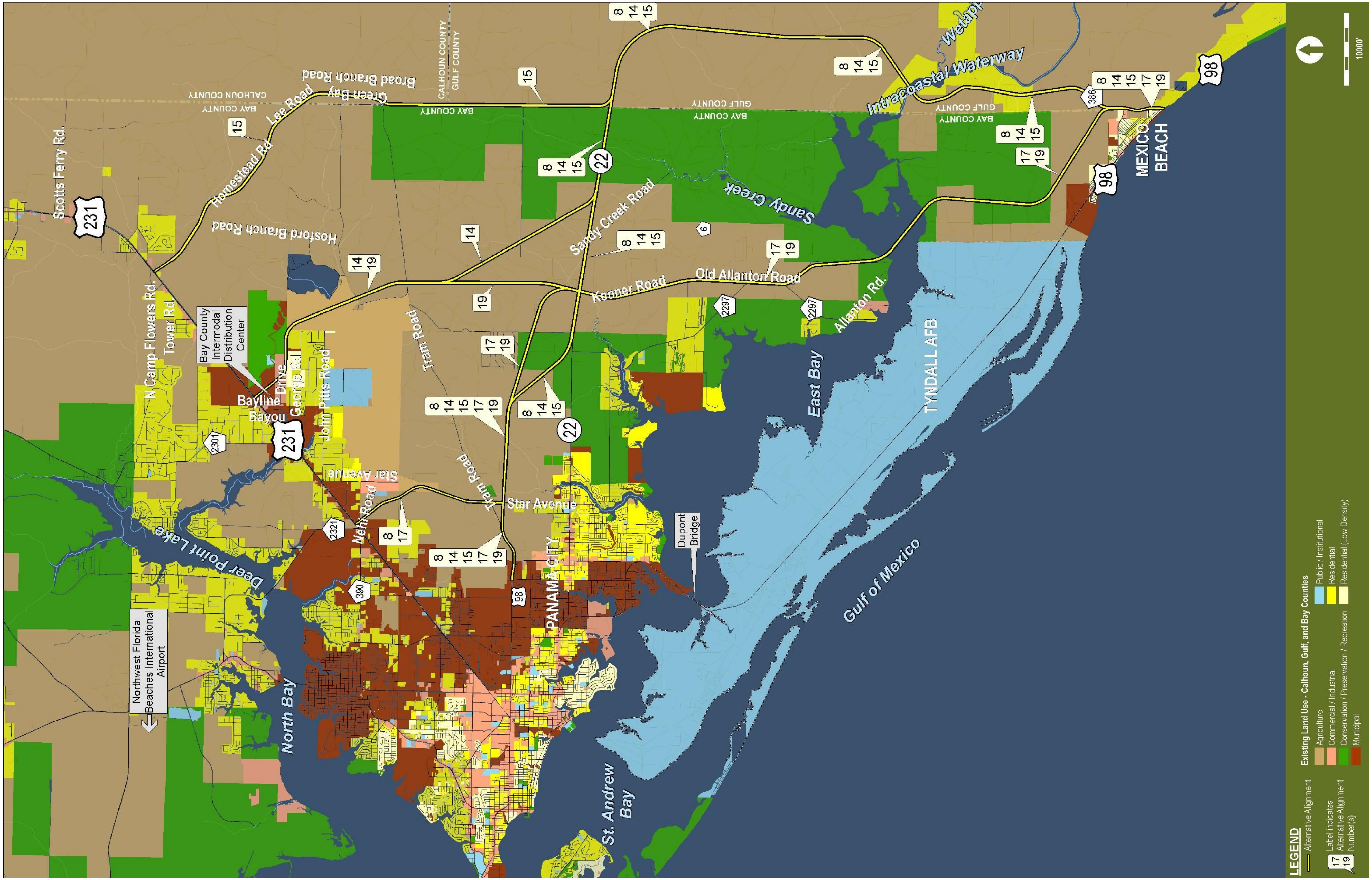
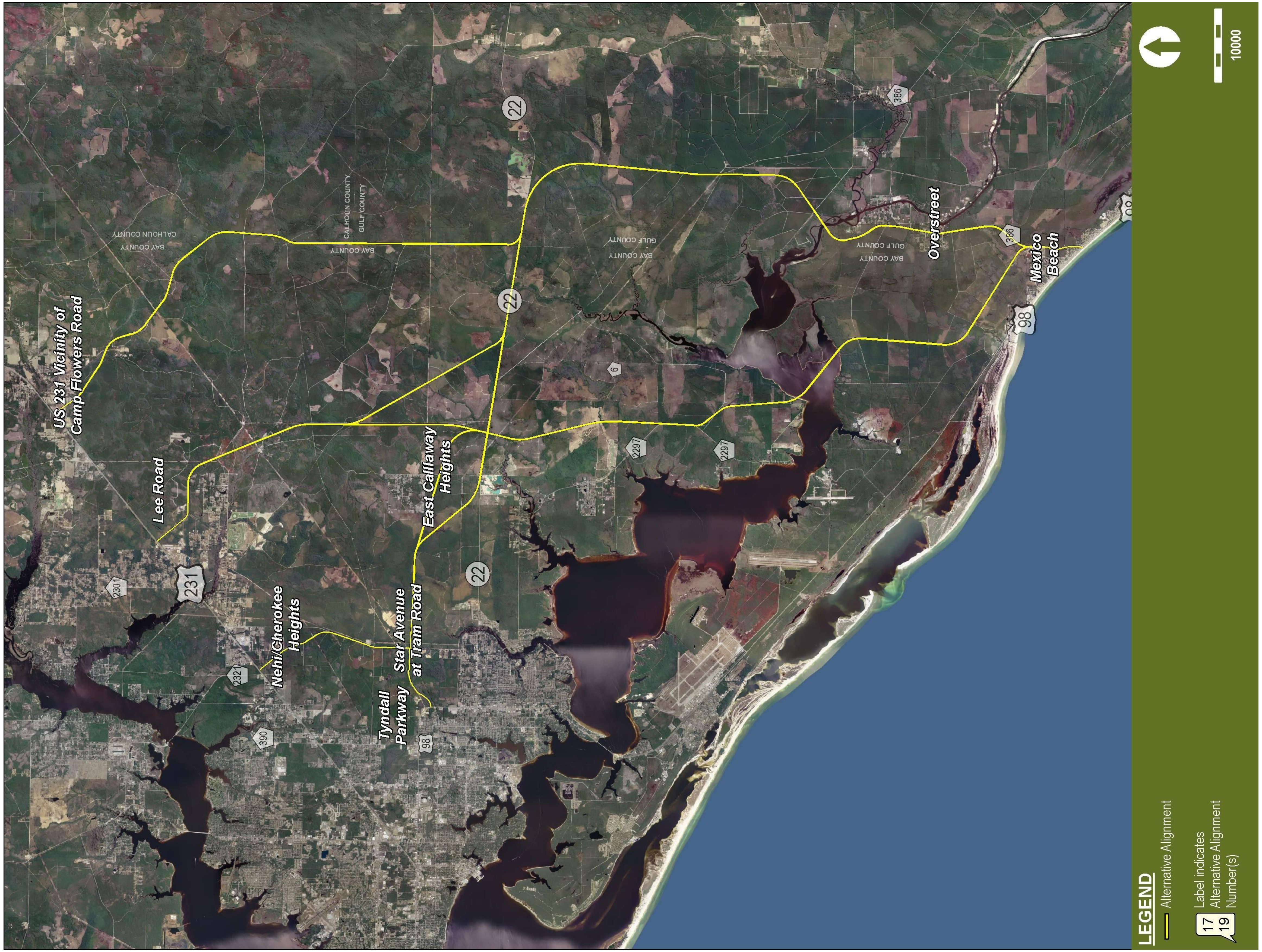


Figure 3-2: Noise Sensitive Areas



3.1.2 Overstreet Community Area

The rural community of Overstreet is located north of Mexico Beach on existing CR 386. No commercial developments exist in this area, just single family residences and agriculture land uses. 11 representative receptors, representing 14 residences were analyzed in this area.

3.1.3 Star Avenue at Tram Road

There is a permitted residential development with three residences constructed located east of the intersection of Star Avenue and Tram Road. One receptor was modeled to represent three residences.

3.1.4 Tyndall Parkway Area

The intersection of Tram Road with Tyndall Parkway area is mostly commercial in nature. The Veterans Affairs Nursing Home is the only noise sensitive site in the area. No other areas of frequent human use occur here.

3.1.5 Nehi/Cherokee Heights Area

Most of the area traversed by the project alignments is undeveloped, but there are two noise sensitive sites within the area which are single family residences on the east side of US 231. On the west side of US 231, there are five single family residences.

3.1.6 Lee Road

The Bay County Correctional Facility was analyzed in the Lee Road area.

3.1.7 US 231 Vicinity of Camp Flowers Road

There are two single family houses along US 231 in the vicinity of the proposed intersection of the Gulf Coast Parkway with US 231 near Camp Flowers Road.

Table 3-1: Summary of Noise Sensitive Areas by Alternative

NSA	Predominant Land Use	Alternative				
		8	14	15	17	19
Mexico Beach	Residential	X	X	X	X	X
Overstreet	Residential	X	X	X		
Star @ Tram Road	Residential	X	X	X	X	X
Tyndall Parkway	Commercial/ Municipal	X	X	X	X	X
Nehi/Cherokee Heights	Residential/ Municipal	X			X	
Lee Road	Residential			X		
Camp Flowers Road	Residential			X		

3.2 RECEPTOR IDENTIFICATION

A noise receptor can be discrete or a representative location for the land use activity categories listed in the table of NAC (**Table 2-3**). Receptor points representing the noise sensitive areas for this project were located in accordance with the guidelines in Chapter 17 of the FDOT's *PD&E Manual* as follows:

- Residential receptor sites were placed at the edges of buildings closest to the major traffic noise source.
- Where more than one noise sensitive site was clustered together, a single receptor site was analyzed as representative of the group.
- Ground floor receptor sites were assumed to be 5 feet above the ground elevation.

Noise receptors representing the aforementioned NSA have been identified for prediction of existing and future noise levels with and without the proposed improvement. The noise receptors for each NSA are identified in **Table 3-3** and shown in **Appendix B**.

In addition to existing noise sensitive sites, a traffic noise evaluation must also consider sites that have been permitted. Consistent with the FDOT PD&E Manual, sites that have been granted a building permit prior to the date of public knowledge (i.e., date that the environmental document has been approved by the FHWA) should be evaluated as existing noise sensitive sites. Though an initial analysis has been completed, a complete land use review will be performed during the design phase to identify noise sensitive sites that may have received a building permit subsequent to this noise study but prior to the date of public knowledge. Known permitted noise sensitive sites have been evaluated for traffic noise and abatement considerations with this NSR.

3.3 MEASURED NOISE LEVELS

Noise monitoring was performed on September 17-18, 2012 to establish background noise levels so that any substantial increases could be documented. The noise monitoring followed procedures documented in

Measurement of Highway-Related Noise[3] (FHWA, 1996). Noise measurements were obtained using a Larson Davis 820SLM noise monitor. The monitor was calibrated at 114.0 dB and was checked prior to each monitoring trial by a Larson Davis CAL200 calibrator. All monitoring events were ten minutes in duration consistent with the PD&E Manual.

For the purpose of model validation, site selection for the noise monitoring was dependent on the location of noise sensitive sites and access to monitoring sites where traffic data could be simultaneously recorded. Traffic volumes by vehicle classification (i.e., cars, medium trucks, heavy trucks) were documented for each 10-minute monitoring event. Average traffic speeds for each vehicle type were determined by sampling with a radar gun.

A noise prediction was generated for modeling verification using TNM. The predicted and ambient noise levels for each event are provided in **Table 3-2**. The decibel variance between predicted and measured noise levels at each monitoring site was equal to or less than three dB(A). Therefore, the noise model verification was within the accepted level of accuracy required in FDOT's *PD&E Manual*. At the rest of the monitoring events the ambient noise levels were taken to establish background noise levels so that any substantial increases can be documented. Monitoring sites # 3, 5, and 6 were ambient monitoring trials.

[3] Federal Highway Administration Report Number FHWA-PD-96-046, *Measurement of Highway Related Noise*, Cynthia S. Y. Lee and Gregg G. Fleming, May 1996, 206 pages' http://www.fhwa.dot.gov/environment/noise/measurement/mhrn00.cfm

Table 3-2: Noise Monitoring and Model Verification

Location	Trial #	Time	Date	Field Measured Level [dB(A)]	Computer Predicted Level [dB(A)]	Variance [dB(A)]
Monitoring Site # 1 50 ft. West of the edge of pavement on CR 386 south of North Long Drive	1	4:35PM	9/17/12	57.8	56.3	1.5
	2	4:46 PM	9/17/12	58.2	56.3	1.9
Monitoring Site #2 50 ft. West of the edge of pavement on CR 386 north of North Long Drive	1	5:14 PM	9/17/12	51.3	50.2	1.1
	2	5:35 PM	9/17/12	48.2	50.2	2.0
Monitoring Site #3 30 ft. West of the edge of road surface on Cherokee Heights Road	1	11: 04 AM	9/18/12	49.9	N/A	N/A
	2	11: 14 AM	9/18/12	50.2	N/A	N/A
	3	11: 24 AM	9/18/12	49.9	N/A	N/A
	4	11: 34 AM	9/18/12	50.5	N/A	N/A
	5	11: 44 AM	9/18/12	50.9	N/A	N/A
	6	11: 55 AM	9/18/12	50.2	N/A	N/A
Monitoring Site #4 50 ft. East of the edge of pavement on US 231 near Nehi Road near Tram Road	1	12:15PM	9/18/12	59.2	57.1	2.1
	2	12:38 PM	9/18/12	60.1	57.2	2.9
Monitoring Site #5 30 ft. East of the edge of pavement on Tram Road	1	2:30 PM	9/18/12	48.2	N/A	N/A
	2	2:41 PM	9/18/12	49.2	N/A	N/A
	3	2:51 PM	9/18/12	48.5	N/A	N/A
	4	3:02 PM	9/18/12	48.1	N/A	N/A
	5	3:12 PM	9/18/12	47.9	N/A	N/A
	6	3:25 PM	9/18/12	48.0	N/A	N/A
Monitoring Site #6 30 ft. South of the edge of pavement on Bay Line Drive-Lee Road Area	1	9:42 AM	9/18/12	46.0	N/A	N/A
	2	9:55 AM	9/18/12	45.6	N/A	N/A
	3	10:05 AM	9/18/12	46.1	N/A	N/A
	4	10:15 AM	9/18/12	46.3	N/A	N/A
	5	10:25 AM	9/18/12	45.8	N/A	N/A
	6	10:35 AM	9/18/12	46.1	N/A	N/A
Monitoring Site #7 US 231 near Camp Flowers Road Area	1	9:10 AM	9/18/12	61.2	59.4	1.8

3.4 PREDICTED NOISE LEVELS

Once TNM was validated as accurately predicting traffic noise levels, noise levels were predicted at the noise sensitive receptors for each NSA for the year 2011 and design (2035) years. Predicted noise levels for the modeled noise sensitive sites are provided in **Table 3-3**. The predicted noise levels of the receptors identified in **Table 3-3** are depicted on aerials in **Appendix B**.

3.4.1 Mexico Beach

Two receptors representing two residences were evaluated to the east of CR 386 in the Mexico Beach area. The residences are single-family homes, and were evaluated under Activity Category B of the NAC. These residences are represented by Receptors 1 and 2.

Eight receptors representing eight residences were evaluated to the west of CR 386 between US 98 and 15^{th} Street in the Mexico Beach area. The residences are single-family homes, and were evaluated under Activity Category B of the NAC. These residences are represented by Receptors 3-10.

The predicted noise levels for the receptors representing these noise sensitive sites can be found in **Table 3-3**.

3.4.2 Overstreet Community Area

Receptors 11, 15, and 18 representing three residences were evaluated west of CR 386. Receptor 11 is located adjacent to the Basswood/CR 386 intersection and Receptors 15 and 18 are both just south of Sunshine Road. These residences are all single family homes, and were evaluated under Activity Category B of the NAC.

Receptors 12-14, 16-17, and 19-21 are located east of CR 386 and all represent single residences. All of these residences are single-family dwellings and located north of Long Street. They are also all evaluated under Activity Category B of the NAC.

The predicted noise levels for the receptors representing these noise sensitive sites can be found in **Table 3-3**.

3.4.3 Star Avenue at Tram Road

One receptor (Receptor 22) representing three permitted residential parcels were evaluated to the east of Star Avenue and south of Tram Road. All the parcels are future single family residences and were evaluated under Activity Category B of the NAC. A single representative receptor was evaluated between the three potential sites in this area.

The predicted noise levels for this receptor can be found in **Table 3-3**.

3.4.4 Nehi/Cherokee Heights Area

Two receptors (23 and 24) representing two residences are located east of the build alternative in this area and east of existing Cherokee Heights Road. Five receptors (25-29) are located on the west side of US 231. These receptors are all single family residences and were evaluated under Activity Category B of the NAC.

The predicted noise levels for these receptors can be found in **Table 3-3**.

3.4.5 Tyndall Parkway Area

One receptor is located in this area. Receptor 30 (Veterans Affairs Nursing Home) is a nursing home and was evaluated as Activity Category C of the NAC.

The predicted noise levels for the receptor can be found in **Table 3-3**.

3.4.6 Road

One receptor (Receptor 31) representing Bay County Correctional Facility was evaluated to the north of Build alternatives 14 and 19 and located on Bay Line Drive. It was evaluated under Activity Category C of the NAC.

The predicted noise levels for this receptor can be found in **Table 3-3**.

3.4.7 US 231 Vicinity of Camp Flowers Road

Receptor 32 is located south of the Build alternative 15 while Receptor 33 is located north of it in this area. These receptors were evaluated under Activity Category B of the NAC.

The predicted noise levels for these receptors can be found in **Table 3-3**.

Table 3-3: Predicted Noise Levels

Receptor ID	NAC Activity Category*	Alternative Involved	2011 Existing (dB(A))	2035 No-Build (dB(A))	2035 Build (dB(A))	Difference between Existing and Build (dB(A))	Is the Site Impacted?
Mexico Beach							
1	B	8,14,15,17,19	52.4	56.2	62.7	10.3	No
2	B	8,14,15,17,19	53.6	57.3	63.2	9.6	No
3	B	8,14,15,17,19	59.5	63.3	62.6	3.1	No
4	B	8,14,15,17,19	58.1	61.9	61.8	3.7	No
5	B	8,14,15,17,19	57.0	60.8	60.9	3.9	No
6	B	8,14,15,17,19	58.0	61.8	61.1	3.1	No
7	B	8,14,15,17,19	60.6	64.4	62.3	1.7	No
8	B	8,14,15,17,19	60.0	63.8	68.1	8.1	Yes
9	B	8,14,15,17,19	60.0	63.8	62.9	2.9	No
10	B	8,14,15,17,19	62.2	66.0	64.1	1.9	No
Overstreet Area							
11	B	8,14,15	51.3	55.0	61.9	10.6	No
12	B	8,14,15	53.6	57.4	57.7	4.1	No
13	B	8,14,15	51.6	55.4	55.7	4.1	No
14	B	8,14,15	56.6	60.4	60.4	3.8	No
15	B	8,14,15	53.1	56.8	57.3	4.2	No
16	B	8,14,15	54.4	58.2	58.7	4.3	No
17	B	8,14,15	54.3	58.1	58.5	4.2	No
18	B	8,14,15	51.4	55.2	55.4	4.0	No
19	B	8,14,15	51.8	55.6	55.8	4.0	No
20	B	8,14,15	47.8	51.6	56.0	8.2	No
21	B	8,14,15	46.8	50.5	54.3	7.5	No
Star Avenue at Tram Road							
22	B	8,17	42.1	45.1	48.8	6.7	No
Nehi/Cherokee Heights							
23	B	8,17	42.2	43.4	45.5	3.3	No
24	B	8,17	42.2	43.3	46.5	4.3	No

Receptor ID	NAC Activity Category*	Alternative Involved	2011 Existing (dB(A))	2035 No-Build (dB(A))	2035 Build (dB(A))	Difference between Existing and Build (dB(A))	Is the Site Impacted?
25	B	8,17	58.8	61.0	62.0	3.2	No
26	B	8,17	55.0	57.2	57.6	2.6	No
27	B	8,17	59.4	61.4	61.5	2.1	No
28	B	8,17	59.2	61.1	61.3	2.1	No
29	B	8,17	64.9	66.9	66.9	2.0	Yes
Tyndall Parkway							
30	C*	8,14,15,17,19	48.3	48.3	49.6	2.7	No
Lee Road							
31	C*	14,19	42.7	42.7	45.2	2.5	No
US 231 Vicinity of Camp Flowers Road							
32	B	15	58.6	60.8	63.1	4.5	No
33	B	15	61.4	63.6	65.6	4.2	No

*Both Activity Categories B and C have approach noise abatement levels of 66 dB(A)

3.5 NOISE IMPACT ANALYSIS

As stated previously, a traffic noise impact occurs when the noise levels at a noise receptor approach (are within 1 dB(A) of) or exceed the FHWA's NAC (**Table 2-3**) for the category in which that receptor falls, or the noise receptor experiences a substantial increase in noise levels (an increase of 15 dB(A) or greater) over existing noise levels. The noise receptors along the Gulf Coast Parkway fall within Activity Categories B or C of the NAC. The NAC for Categories B and C is 67 dB(A), therefore, the noise level at which a receptor is considered impacted under the NAC for a Category B or C receptor is 66 dB(A). The NAC for Category E receptors is 72 dB(A), therefore, the noise level at which a Category E receptor is impacted is 71 dB(A).

The aforementioned receptors were evaluated for noise impacts under the No Build and all Build alternatives. The predicted existing (2011) and future (2035) noise levels for the No Build and Build alternatives is presented in **Table 3-3**. Under the No Build Alternative, one receptor (29) experienced noise levels in excess of the NAC. Under the Build alternatives, the NAC was exceeded by two receptors (8 and 29). None of the impacts were the result of substantial increases in noise levels (increases in excess of 15 dB(A). The predicted noise levels and impacted receptors are discussed below.

For the No Build Alternative, predicted traffic noise levels would range from 43.3 dB(A) to 66.9 dB(A) in the Design Year (2035). There is one total receptor that approach or exceed the applicable levels of the NAC. The impacted receptor is 29.

For Alternative 8, predicted traffic noise levels would range from 45.5 dB(A) to 68.1 dB(A) in the Design Year (2035). There are two total receptors that approach or exceed the applicable levels of the NAC. These impacted receptors are 8 and 29.

For Alternative 14, predicted traffic noise levels would range from 45.2 dB(A) to 68.1 dB(A) in the Design Year (2035). There is one total receptor that approaches or exceeds the applicable levels of the NAC. The impacted receptor is identified as 8.

For Alternative 15, predicted traffic noise levels would range from 49.6 dB(A) to 68.1 dB(A) in the Design Year (2035). There is one total receptor that approaches or exceeds the applicable levels of the NAC. The impacted receptor is identified as 8.

For Alternative 17, predicted traffic noise levels would range from 45.5 dB(A) to 68.1 dB(A) in the Design Year (2035). There are two total receptors that approach or exceed the applicable levels of the NAC. These impacted receptors are 8 and 29.

For Alternative 19, predicted traffic noise levels would range from 45.2 dB(A) to 68.1 dB(A) in the Design Year (2035). There is one total receptor that approaches or exceeds the applicable levels of the NAC. The impacted receptor is identified as 8.

3.5.1 Types of Noise Abatement Considered

Abatement measures to be considered include traffic management measures, alignment modifications, property acquisition, land use controls, and noise barriers.

TRAFFIC MANAGEMENT MEASURES

As an abatement technique, traffic management measures include modified speed limits or prohibition of certain vehicle types. Modifying the speed limit would reduce the capacity of the Gulf Coast Parkway to service forecasted traffic volumes. As a public use corridor used to transport goods and support businesses, prohibiting truck traffic is not a viable option to reduce traffic noise. Therefore, traffic management measures are not considered a feasible abatement technique for this project.

ALIGNMENT MODIFICATION

Alignment modification involves orientating and/or constructing the roadway at a sufficient distance from the noise sensitive areas so as to minimize traffic noise. Since the Gulf Coast Parkway alternatives include significant segments of new alignment, reductions in noise impacts may be achievable by modifying an alternative's alignment.

PROPERTY ACQUISITION

The acquisition of property to provide noise buffers is not feasible for several reasons, the most prominent being the exorbitant cost of land acquisition. Further development in the area continues to increase making the availability of vacant land in proximity to noise sensitive sites unlikely.

LAND USE CONTROLS

Land use controls can be used to minimize traffic noise in future developments or areas where development occurs. As a part of this process, the planning officials can take into account the presence of the Gulf Coast Parkway. The distance to the 66 dB(A), 71 dB(A), and Substantial Increase (where applicable) noise contours for the Design Year (2035) Build condition is provided in **Table 3-4.** Local planning officials can use the noise contour information to control development of noise sensitive land uses on currently undeveloped lands.

Table 3-4: Gulf Coast Parkway Design Year Noise Contours

	Typical Section	Alternatives Involved	Distance to the 66 dB(A) Noise Contour*	Distance to the 71 dB(A) Noise Contour*	Distance to the Substantial Increase Noise Contour*
Mexico Beach	Urban	8, 14, 15, 17, 19	Inside right-of way (ROW)	Inside ROW	N/A
Overstreet	Rural	8, 14, 15	Inside ROW	Inside ROW	N/A
SR 22	Rural	8, 14, 15	145'	59'	N/A
Star Avenue	Urban	8,17	46'	Inside ROW	86'
Tyndall Parkway	Urban	8, 14, 15, 17, 19	54'	Inside ROW	90'
Lee Road	Urban	14, 19	Inside ROW	Inside ROW	68'
	Rural	14, 19	Inside ROW	Inside ROW	73'
US 231/Camp Flowers Road	Urban	15	Inside ROW	Inside ROW	N/A
	Rural	15	Inside ROW	Inside ROW	N/A

*Distance from the proposed nearest edge of pavement.

3.5.2 Noise Barrier Analysis

Noise barriers are to be evaluated for each NSA that contains one or more noise sensitive receptors with a predicted noise level that approaches or exceeds the NAC for the Design Year build conditions, or are predicted to experience a substantial increase in noise levels above existing conditions. At each potential noise barrier location, the feasibility (i.e., achievement of at least a five decibel reduction at two or more impacted receptors with a design goal reduction of seven dB(A) at one or more receptors and constructability of the noise barrier) of the proposed barrier is evaluated. If feasible, then the reasonableness of the barrier is determined.

Noise barrier construction was not feasible at receptors 8 and 29 as they do not meet the feasibility requirements. The goal of achieving a 5 decibel dB (A) reduction for two impacted receptors in order for a noise barrier to be considered feasible was not met as the impacted receptors were isolated receptors.

SECTION 4 CONCLUSIONS

For the Design Year (2035) No Build conditions, one receptor (29) is predicted to experience traffic noise levels that approach or exceed the NAC. In the Design Year (2035) Build conditions all of the Build alternatives evaluated will have at least one impacted receptor. The Design Year (2035) Build conditions are as follows; Alternative 8 and 17 have two shared impacted receptors (Receptors 8 and 29) and Alternatives 14, 15, and 19 have one shared impacted receptor (Receptor 8). Receptor 8 represents one single family home located in the Mexico Beach area and receptor 29 represents one single family home located west of US 231 in the Nehi Road area.

Noise abatement measures were considered for the two receptors predicted to experience traffic noise levels that approach or exceed the NAC. An evaluation of traffic system management techniques, alignment modifications, and property acquisition were evaluated as possible abatement measures. A noise barrier does not appear to be a reasonable solution available to abate noise at the two impacted noise sensitive sites (Receptors 8 and 29). Noise barrier feasibility could not be achieved at both of the receptors as neither met the achievement of at least a five decibel reduction at two or more impacted receptors.

Alignment modifications will be used to minimize noise levels at the impacted receivers where feasible. During the design phase, the proposed alignment modification in the vicinity of receptor 8 is feasible. This receptor was a shared receptor by all of the evaluated Build alternatives (8, 14, 15, 17, and 19). The Build alternatives will be shifted further east to reduce the noise levels at this location. However, alignment shifts will not lessen noise levels at 29 since the primary source for the noise impacts is US 231 and not the proposed project.

The FDOT is committed to the construction of feasible and reasonable noise abatement measures at the noise-impacted locations of receptor 8. The noise abatement measure chosen for receptor 8 was alignment modification described above. Based on the noise analyses performed to date, there appears to be no apparent solution available to mitigate the noise impacts at receptor 29. It is anticipated that the application of the FDOT *Standard Specifications for Road and Bridge Construction* will minimize or eliminate most potential construction noise and vibration impacts. However should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in concert with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

Construction noise and vibration sensitive sites adjacent to the project include: schools, churches, eye centers, medical centers, and residences. For these sensitive sites the application of the FDOT *Standard Specifications for Road and Bridge Construction* will minimize or eliminate most potential construction noise and vibration impacts. However should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in concert with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.
Noise and vibration effects on fish from pile driving may be managed with one of the following measures,

1) Use of wood or concrete piles instead of hollow steel piles.
2) If using hollow steel piles, restrict their installation to a time of year when larval and juvenile stages of fish species with designated Essential Fish Habitat (EFH) are not present; drive piles during low tide periods when located in intertidal and shallow subtidal areas; use a vibratory hammer as much as possible; monitor peak Sound Pressure Level (SPLs) during pile driving to ensure that they do not exceed the 190 dB re 1PA threshold for injury to fish; employ measures to attenuate sound should SPLs exceed 180 dB re 1 PA (i.e. air bubble curtain system or air-filled coffer dam, use of a smaller hammer, and use of a hydraulic

hammer if impact driving cannot be avoided); and drive piles when the current is reduced in areas of strong current.

3) Use of the construction technique called “ramping up” which requires the contractor to use soft-start procedures where the hammer is not used at full strength at the start of a pile driving session.

The need for these measures will be further evaluated during the project’s design and special provisions may be added to the project’s construction specifications, as appropriate.

A land use review will be implemented again during the project’s design phase to identify noise sensitive sites that have received a building permit after October 10, 2012 but prior to the date of public knowledge (i.e., date that the project’s environmental document is approved). If the review identifies noise sensitive sites that have been permitted prior to the date of public knowledge, then the noise sensitive sites will be evaluated for traffic noise and abatement considerations, if needed.

SECTION 5 CONSTRUCTION NOISE AND VIBRATION

Land uses adjacent to the proposed Gulf Coast Parkway are identified on the FDOT listing of noise- and vibration-sensitive sites (e.g., residences). Construction of the proposed roadway improvements is not expected to have any substantial noise or vibration impact. If additional sensitive land uses develop adjacent to the roadway prior to construction, increased potential for noise or vibration impacts could result. It is anticipated that the application of the *FDOT Standard Specifications for Road and Bridge Construction* will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts. The potential effects on the human and non-human environment associated with the noise and vibration from the construction of this project have been addressed separately, below.

5.1 HUMAN ENVIRONMENT

Typical land uses that are sensitive to noise and vibration generated by construction equipment and activities are identified in **Table 5-1**.

Table 5-1
Construction Noise and Vibration Sensitive Sites

Noise	Vibration
Eye Centers/Clinics Medical Centers Hospitals Geriatric Centers Sound Recording Studios TV/Radio Stations Residences Technical Laboratories Hearing Testing Centers Theaters Schools Motels/Hotels Funeral Homes Libraries Meditation Centers Churches/Shrines Parks Day Care Centers Outdoor Theaters	Eye Centers/Clinics Medical Centers Hospitals Geriatric Centers Sound Recording Studios TV/Radio Stations Residences Technical Laboratories Antiques Shops Museums Historic Buildings

Note: This list is not meant to be all inclusive or exclusive, but rather an indication of the type of sites likely to be sensitive to construction noise and/or vibration.

Source: FDOT Noise and Vibration Task Team; August 17, 1999.

Adverse noise and vibration effects on these sites depends on a number of factors including: how far the construction activities are from the sensitive sites; the types of equipment used; the specific model of a particular type of equipment; the condition of the equipment; the operation being performed; whether the equipment is stationary or mobile; the number and types of equipment in use at any given time; and the length of time the equipment is operated. The predominant source of noise from most construction equipment is the engine, but in some instances, it is the process that generates the noise, such as in pile-driving or pavement-breaking. **Table 5-2** provides a list of construction equipment associated with transportation improvements and the typical noise level [in dB(A)] emitted by the equipment at a distance of 50-feet from the source.

Construction activities can also result in vibrations which spread through the ground. Buildings in the close vicinity to the construction site respond to these vibrations with varying results. In most cases, buildings will not be damaged by the vibrations. The exception is fragile buildings, many of which are old. Even though buildings may not be harmed, the vibrations could pose a problem for activities conducted in the buildings (refer to **Table 5-1**). Typically, the most severe vibrations are generated by impact pile-driving and blasting. But considerable variation in ground vibration levels has been reported for the same construction equipment, probably the result of varying soil conditions between the construction sites.

For this project, there are land uses adjacent to the project corridor that would be considered sensitive to construction noise and/or vibration. These sensitive sites are: schools, churches, eye centers, medical centers, and residences. There are no historic structures that would be susceptible to vibration impacts. FDOT's *Standard Specifications for Road and Bridge Construction* contains measures to minimize most noise and vibration effects resulting from construction activities. However, as part of the re-evaluation of the noise analysis, during the design phase, when the types of equipment that will be used in the vicinity of these sites can be determined, an analysis of potential impacts will be conducted to determine whether special mitigation measures will be required.

Table 5-2
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dB(A)) at 50 feet from Source
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-driver (impact)	101
Pile-driver (sonic)	96
Pneumatic tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88

Source: US Environmental Protection Agency, *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, NTID300.1, December 31, 1971.

5.2 NON-HUMAN ENVIRONMENT

In addition to impacts to the human environment, construction noise and vibration impacts are thought to have impacts on fish and wildlife. Unfortunately very few reliable studies have been conducted on the impacts of either traffic or construction noise on wildlife. Additionally, of the studies that have been conducted, the results cannot necessarily be assumed applicable to wildlife species other than the ones studied due to the differences in hearing and noise sensitivity between and among species.

However, of the various sources that cause construction noise and vibration, the effects of pile-driving on fish and other aquatic species appear to have been more frequently studied than those from other sources, probably since pile-driving generates some of the most severe noise and vibration effects. The type and intensity of the sounds produced during pile driving depend on a variety of factors, including but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer[4]. The degree to which an individual fish exposed to sound is affected is also dependent upon a multitude of factors, including 1) species of fish, 2) fish size, 3) presence of a swim bladder, 4) physical condition of the fish, 5) peak sound pressure and frequency, 6) shape of the sound wave (rise time), 7) depth of the water around the pile, 8) depth of the fish in the water column, 9) amount of air in the water, 10) size and number of waves on the water surface, 11) bottom substrate composition and texture, 12) effectiveness of any attenuation technology employed, 13) tidal currents (if present), and 14) presence of predators[5].

According to the Washington State Department of Transportation the "risk of injury or mortality for aquatic species and fish associated with noise, in general, is related to the effects of rapid pressure changes, especially on gas filled spaces in the body"[6]. Pile-driving can generate intense underwater sound pressure waves. When a fish is exposed to pressure waves of sufficient intensity and/or for sufficient duration, the fish's swim bladder may rupture or the decompression accompanying the sound waves forces the gas in the blood and tissue to vaporize causing the veins to rupture and organ failure[7].

Measures to minimize the effects of pile driving on fish that have been identified in the literature are listed below.

4) Use of wood or concrete piles instead of hollow steel piles.
5) If using hollow steel piles, restrict their installation to a time of year when larval and juvenile stages of fish species with designated Essential Fish Habitat (EFH) are not present; drive piles during low tide periods when located in intertidal and shallow subtidal areas; use a vibratory hammer as much as possible; monitor peak Sound Pressure Levels (SPL) during pile driving to ensure that they do not exceed the 190 dB re 1PA threshold for injury to fish; employ measures to attenuate sound should SPLs exceed 180 dB re 1 PA (i.e. air bubble curtain system or air-filled coffer dam, use of a smaller hammer, and use of a hydraulic hammer if impact driving cannot be avoided); and drive piles when the current is reduced in areas of strong current.

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[4] PND Engineering, Inc., *Knik Arm Crossing Pile-driving Noise Attenuation Measures Technical Report Final*, prepared for, Knik Arm Bridge and Toll Authority, November 2005, pp. 32-33.
[5] PND Engineering, Inc., *Knik Arm Crossing Pile-driving Noise Attenuation Measures Technical Report Final*, prepared for, Knik Arm Bridge and Toll Authority, November 2005, pp. 32-33.
[6] Washington State Department of Transportation, *Biological Assessment Preparation Advanced Training Manual*, Version 02-2012, 7.0 Construction Noise Impact Assessment, p. 7.51.
[7] Transportation Research Board, *Hydroacoustic Impacts on Fish from Pile Installation*, Research Results Digest 363, October 2011, p. 5.

6) Use of the construction technique called “ramping up” which requires the contractor to use soft-start procedures where the hammer is not used at full strength at the start of a pile driving session.

Because the proposed improvement includes bridge construction, the need for these measures will be evaluated during the project’s design and special provisions may be added to the project’s construction specifications as appropriate.

5.3 CONSTRUCTION NOISE AND VIBRATION CONCLUSION

Based on the existing land uses within the limits of this project, construction of the proposed roadway improvements has potential to create noise impacts on noise sensitive sites. In addition, the construction of bridges has the potential to impact aquatic species. Those construction noise and/or vibration impacts that have been identified and for which abatement measures appear to be feasible and reasonable (if any) are noted in the Statement of Likelihood in this report and in the commitments section of the environmental clearance document. If noise-sensitive land uses develop adjacent to the roadway prior to construction, additional impacts could result. It is anticipated that the application of the FDOT *Standard Specifications for Road and Bridge Construction* will minimize or eliminate most potential construction noise and vibration impacts. However should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in concert with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

Construction noise and vibration sensitive sites adjacent to the project include: schools, churches, eye centers, medical centers, and residences. For these sensitive sites the application of the FDOT *Standard Specifications for Road and Bridge Construction* will minimize or eliminate most potential construction noise and vibration impacts. However should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in concert with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

SECTION 6 PUBLIC COORDINATION

Public Information Workshops were held on October 15, 2009 in Bay County and October 20, 2009 in Gulf County. The workshops were held to present the alternatives being considered and to provide the public with an opportunity to express their views regarding the project. Among the comments received, none were regarding traffic noise.

Local officials can promote compatibility between land development and highways. A copy of this report will be provided to local agencies responsible for controlling land use when the Gulf Coast Parkway Environmental Impact Statement (EIS) is approved.

The 66 dB(A), 71 dB(A), and substantial increase noise contours identified in **Table 3-4** and other predicted noise levels provided in this report can be used to restrict development of exterior land uses associated with residences, motels, schools, churches and recreational facilities which would be considered incompatible with traffic noise generated from the preferred alternative for the proposed improvement. Local officials can use the noise contour data to establish compatible development of currently undeveloped parcels or compatible redevelopment in areas where land use changes.

REFERENCES

1. Title 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise; Federal Highway Administration; July 13, 2010.

2. PD&E Manual, Part 2, Chapter 17, Florida Department of Transportation; Tallahassee, Florida; May 24, 2011.

3. Federal Highway Administration Report Number FHWA-PD-96-046, *Measurement of Highway Related Noise*, Cynthia S. Y. Lee and Gregg G. Fleming, May 1996, 206 pages' http://www.fhwa.dot.gov/environment/noise/measurement/mhrn00.cfm

4. PND Engineering, Inc., *Knik Arm Crossing Pile-driving Noise Attenuation Measures Technical Report Final*, prepared for, Knik Arm Bridge and Toll Authority, November 2005, pp. 32-33.

5. PND Engineering, Inc., *Knik Arm Crossing Pile-driving Noise Attenuation Measures Technical Report Final*, prepared for, Knik Arm Bridge and Toll Authority, November 2005, pp. 32-33.

6. Washington State Department of Transportation, *Biological Assessment Preparation Advanced Training Manual*, Version 02-2012, 7.0 Construction Noise Impact Assessments, p. 7.51.

7. Transportation Research Board, *Hydroacoustic Impacts on Fish from Pile Installation*, Research Results Digest 363, October 2011, p. 5.

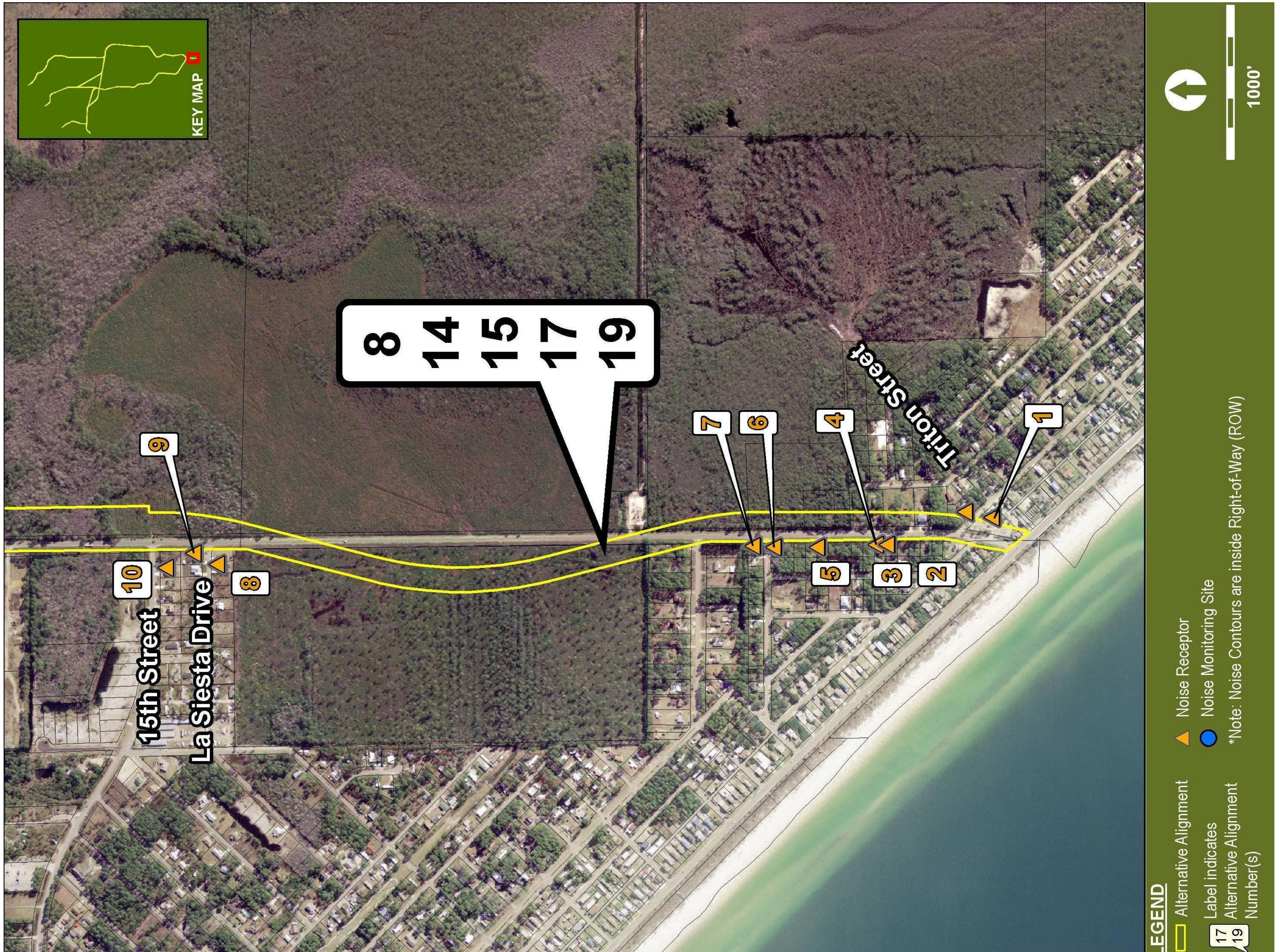
APPENDICES

Draft Noise StudyReport

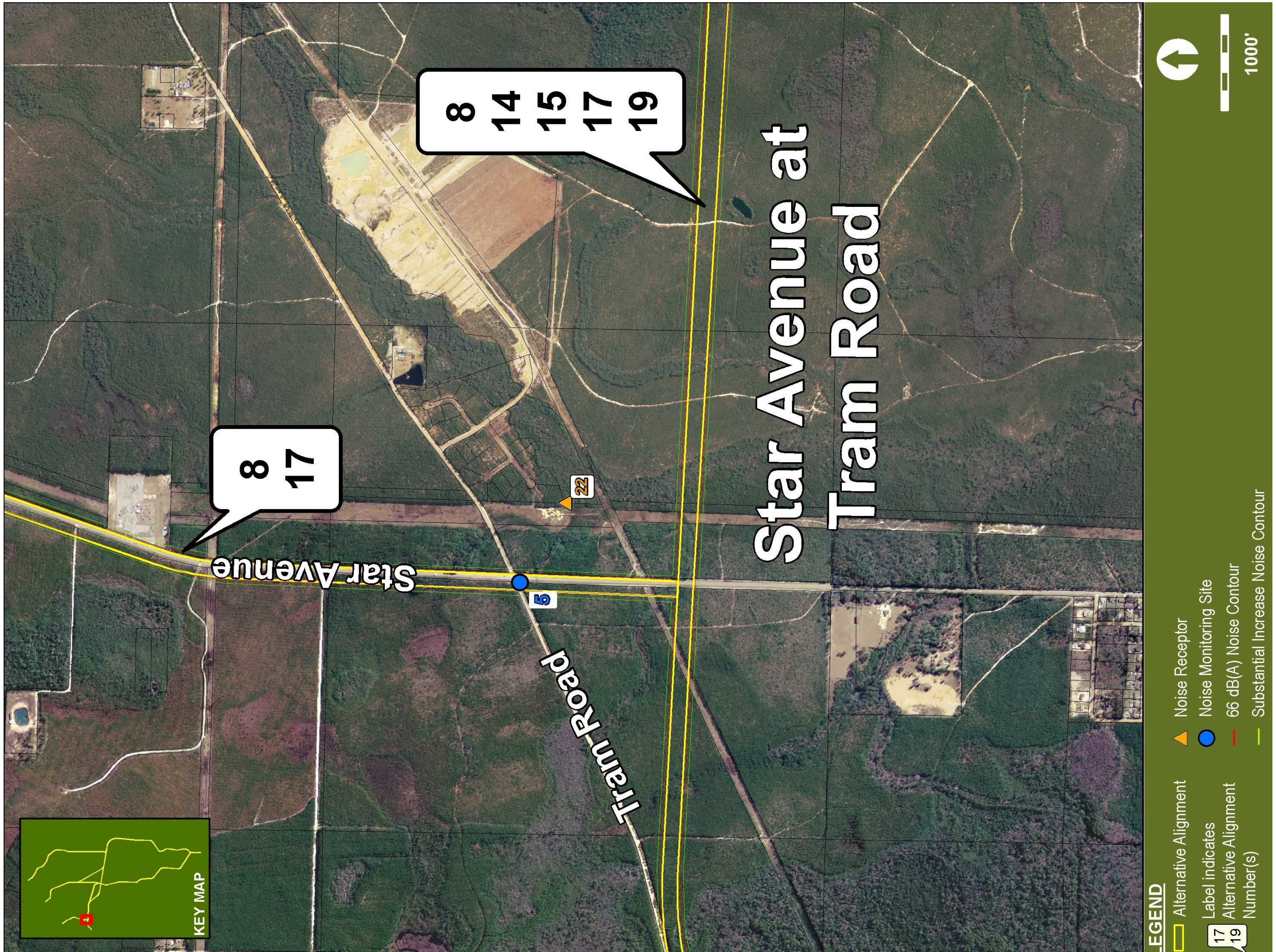
APPENDIX A
TRAFFIC FACTORS

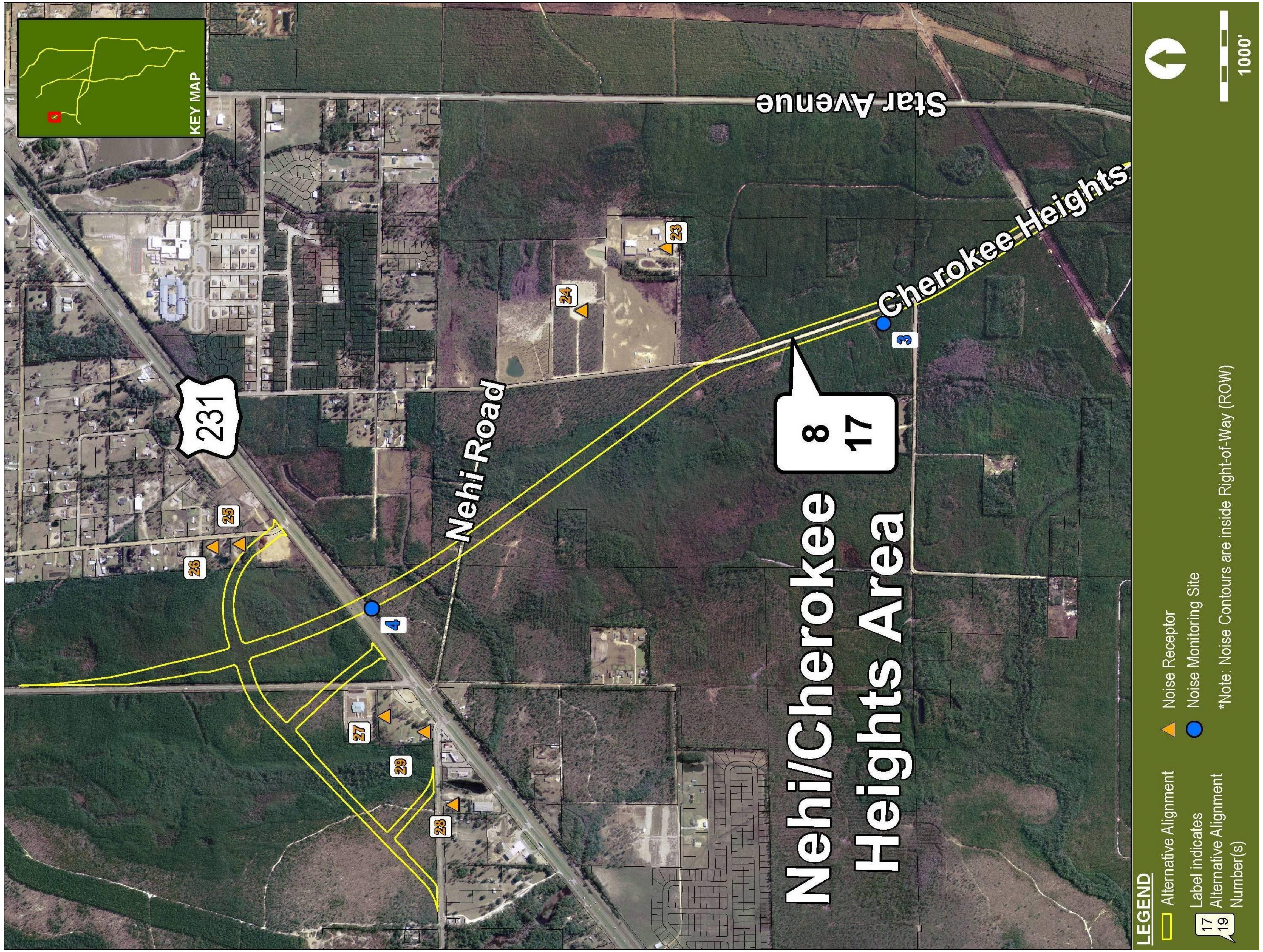
Traffic Segment	LOS C ADT	Demand ADT	Peak Direction Hourly			Off-Peak Direction Hourly			% MT	% HT	K-factor	D-factor	Bi-direction
			Cars	MT	HT	Cars	MT	HT					
US 231 west of CR 2321 (Ex Yr)	34700	21000	1082	58	45	644	34	27	4.88%	3.78%	9.0%	62.7%	1890
US 231 west of CR 2321 (No Build)	34700	41500	1789	96	74	1064	57	44	4.88%	3.78%	9.0%	62.7%	3123
US 231 west of CR 2321 (Build)	53500	54010	2758	147	114	1640	88	68	4.88%	3.78%	9.0%	62.7%	4815
SR 22 east of GCP Segment F (No Build)	13100	6780	309	11	18	250	9	15	3.13%	5.38%	9.0%	55.3%	610
SR 22 east of GCP Segment F (Build)	32800	29590	1347	46	79	1089	37	64	3.13%	5.38%	9.0%	55.3%	2663
Star Ave N of SR 22 (Ex Yr)	15400	6500	299	8	16	242	7	13	2.59%	4.86%	9.0%	55.3%	585
Star Ave N of SR 22 (No Build)	15400	13490	621	17	33	502	14	26	2.59%	4.86%	9.0%	55.3%	1214
Star Ave N of SR 22 (Build)	15400	9940	458	13	24	370	10	19	2.59%	4.86%	9.0%	55.3%	895
CR 386 N of US 98 (Ex Yr)	11000	1100	48	2	6	43	2	5	3.06%	10.03%	9.5%	52.8%	105
CR 386 N of US 98 (No Build)	11000	2790	122	4	14	109	4	13	3.06%	10.03%	9.5%	52.8%	265
CR 386 N of US 98 (Build)	11000	2900	126	4	15	113	4	13	3.06%	10.03%	9.5%	52.8%	276
Tram Rd W of Star Ave (Ex Yr)	15100	900	40	1	2	35	1	2	2.59%	4.86%	9.0%	53.3%	81
Tram Rd W of Star Ave (No Build)	15100	1450	64	2	3	56	2	3	2.59%	4.86%	9.0%	53.3%	131
Tram Rd W of Star Ave (Build)	15100	14050	624	17	33	547	15	29	2.59%	4.86%	9.0%	53.3%	1265
GCP, Segment 26 (Tram Road-Nehi Road) (Build)		10243	455	13	24	398	11	21	2.59%	4.86%	9.0%	53.3%	922
GCP, Seg. 30, 31, 36-38 (SR 22 – US 231) (Build)		1489	66	2	3	58	2	3	2.59%	4.86%	9.0%	53.3%	134
GCP, Seg. 40, 41 (SR 22 – US 231) (Build)		1513	67	2	4	59	2	3	2.59%	4.86%	9.0%	53.3%	136

APPENDIX B
PROJECT AERIALS

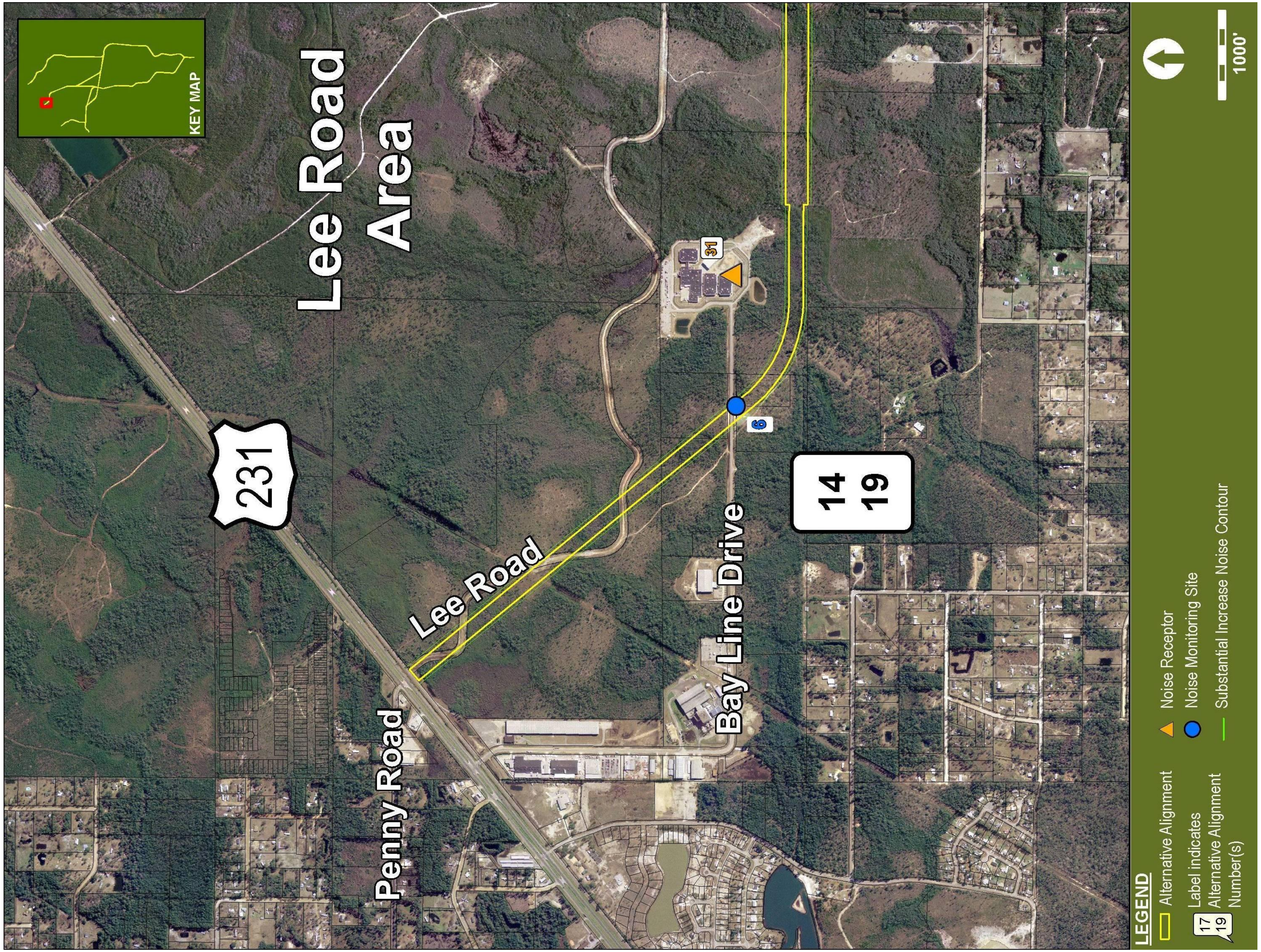

KEY MAP
8
14
15
17
19
Triton Street
15th Street
La Siesta Drive
1
2
3
4
5
6
7
8
9
10
LEGEND
Alternative Alignment
Label indicates Alternative Alignment Number(s)
Noise Receptor
Noise Monitoring Site
*Note: Noise Contours are inside Right-of-Way (ROW)
1000'

KEY MAP
Overstreet
Long Drive
Long Drive
386
Sunshine Road
Basswood Road
Bear Swamp Road
8
14
15
1
2
11
12
13
14
15
16
17
18
19
20
21
LEGEND
Alternative Alignment
Label indicates Alternative Alignment Number(s)
17
19
Noise Receptor
Noise Monitoring Site
*Note: Noise Contours are inside Right-of-Way (ROW)
1000'


Star Avenue at
Tram Road
8
14
15
17
19
8
17
Star Avenue
Tram Road
22
5
KEY MAP
1000'
LEGEND
Alternative Alignment
Label indicates Alternative Alignment Number(s)
17
19
Noise Receptor
Noise Monitoring Site
66 dB(A) Noise Contour
Substantial Increase Noise Contour


KEY MAP
Star Avenue
Cherokee Heights
231
Nehi-Road
8
17
Nehi/Cherokee
Heights Area
3
4
23
24
25
26
27
28
29
LEGEND
Alternative Alignment
Label indicates
Alternative Alignment
Number(s)
17
19
Noise Receptor
Noise Monitoring Site
*Note: Noise Contours are inside Right-of-Way (ROW)
1000'


Tram Road
Tyndall Parkway
30
98
14th Street
11th Street
KEY MAP
LEGEND
Alternative Alignment
Label indicates Alternative Alignment Number(s)
17
19
Noise Receptor
Noise Monitoring Site
66 dB(A) Noise Contour
Substantial Increase Noise Contour
1000'


KEY MAP
Lee Road Area
231
Lee Road
Penny Road
Bay Line Drive
31
6
14
19
1000'
LEGEND
Alternative Alignment
17
19
Label indicates Alternative Alignment Number(s)
Noise Receptor
Noise Monitoring Site
Substantial Increase Noise Contour


KEY MAP
US 231 Vicinity of North Camp Flowers Road
Bear Creek Road
Tracy Way
North Camp Flowers Road
231
15
7
33
32
1000'
LEGEND
Alternative Alignment
Label indicates Alternative Alignment Number(s)
17
19
Noise Receptor
Noise Monitoring Site
*Note: Noise Contours are inside Right-of-Way (ROW)

APPENDIX C
NOISE MONITORING SHEETS

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/17/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

CR 386 S of N Long Drive (50' from EOP)

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other________
Temperature____ Humidity______ Wind Speed_____ Wind Direction______

Equipment: Sound Level Meter: Type: ______________________ Serial Number:______
Did you check the battery? Yes____ No____ Calibration Reading: Start_____ End______
Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________
Calibrator: Type: ______________________ Serial Number: ______
Did you check the battery? Yes____ No____

Time Study Started: 4:46 Time Study Ended:______________

TRAFFIC DATA

Roadway Identification	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 56.3 L10 _____ L50 _____ L90 _____ L95 _____ Other __________

Background Noise:______________________
Major Sources:______________________
Unusual Events:______________________
Other Notes:______________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 7/17/12

State Project #:____________ FI #:____________ Federal Aid #____________
Project Location:
GCP

Site Identification:
CR 386 south of N Long Drive (50' EOP)

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___
Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: ____________ Serial Number:___
Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___
Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)___
Calibrator: Type: ____________ Serial Number:___
Did you check the battery? Yes___ No___

Time Study Started: 4:35 Time Study Ended:____________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ___ LEQ 57.8 L10 ___ L50 ___ L90 ___ L95 ___ Other ___

Background Noise:____________
Major Sources:____________
Unusual Events:____________
Other Notes:____________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By_______________ Date 9/17/12

State Project #:_______________ FI #:_______________ Federal Aid #_______________

Project Location:

GLP

Site Identification:

CR 386 N of W Long Drive (50' from EOP)

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___

Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: _______________ Serial Number:_______

Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___

Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)___

Calibrator: Type: _______________ Serial Number: _______

Did you check the battery? Yes___ No___

Time Study Started: 5:14 Time Study Ended:_______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 57.3 L10 _____ L50 _____ L90 _____ L95 _____ Other _____

Background Noise:_______________

Major Sources:_______________

Unusual Events:_______________

Other Notes:_______________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________ Date 9/17/12

State Project #:________ FI #:________ Federal Aid #________

Project Location:
GCP

Site Identification:
CR 386 N of W Long Drive (50' from EOP)

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other____
Temperature____ Humidity____ Wind Speed____ Wind Direction____

Equipment: Sound Level Meter: Type: ________ Serial Number:____
Did you check the battery? Yes____ No____ Calibration Reading: Start____ End____
Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)____
Calibrator: Type: ________ Serial Number: ____
Did you check the battery? Yes____ No____

Time Study Started:________ Time Study Ended:________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 48.2 L10 ____ L50 ____ L90 ____ L95 ____ Other ____

Background Noise:________
Major Sources:________
Unusual Events:________
Other Notes:________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By______________________ Date 9/18/12

State Project #:__________ FI #:__________ Federal Aid #__________

Project Location:

Cherokee Heights - GCP

Site Identification:

30 ft west of road surface on Cherokee Heights Rd

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other____

Temperature____ Humidity____ Wind Speed____ Wind Direction____

Equipment: Sound Level Meter: Type: __________ Serial Number:______

Did you check the battery? Yes ✓ No____ Calibration Reading: Start____ End____

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)____

Calibrator: Type: __________ Serial Number: ______

Did you check the battery? Yes ✓ No____

Time Study Started: 11:04 Time Study Ended: 11:14

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 49.9 L10 ____ L50 ____ L90 ____ L95 ____ Other ____

Background Noise: Ambient

Major Sources:

Unusual Events:

Other Notes:

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

Cherokee Heights

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other______

Temperature____ Humidity______ Wind Speed_____ Wind Direction______

Equipment: Sound Level Meter: Type: ______________________ Serial Number:_______

Did you check the battery? Yes____ No____ Calibration Reading: Start_____ End_______

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)____________

Calibrator: Type: ______________________ Serial Number: ________

Did you check the battery? Yes____ No____

Time Study Started: 11:14 Time Study Ended:______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ______ LEQ 50.2 L10 ______ L50 ______ L90 ______ L95 ______ Other ______________

Background Noise: Construction, Cicadas

Major Sources:______________________

Unusual Events:______________________

Other Notes:______________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:__________ FI #:__________ Federal Aid #__________

Project Location:

GCP

Site Identification:

Cherokee Heights

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other________
Temperature____ Humidity______ Wind Speed_____ Wind Direction______

Equipment: Sound Level Meter: Type: ______________ Serial Number:______
Did you check the battery? Yes____ No____ Calibration Reading: Start____ End______
Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________
Calibrator: Type: ______________ Serial Number: ______
Did you check the battery? Yes____ No____

Time Study Started: 11:24 Time Study Ended:______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 49.9 L10 _____ L50 _____ L90 _____ L95 _____ Other __________

Background Noise:______________

Major Sources:______________

Unusual Events:______________

Other Notes:______________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By_______________________________ Date_______________

State Project #:_______________ FI #:_______________ Federal Aid #_______________

Project Location:

__ GCP

____

Site Identification:

Cherokee Heights

____

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other________
Temperature____ Humidity______ Wind Speed_____ Wind Direction_____

Equipment: Sound Level Meter: Type: _______________ Serial Number:_______
Did you check the battery? Yes____ No____ Calibration Reading: Start_____ End_______
Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________
Calibrator: Type: _______________ Serial Number: ________
Did you check the battery? Yes____ No____

Time Study Started:_ ____11:34________ Time Study Ended:_______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 50.5 L10 _____ L50 _____ L90 _____ L95 _____ Other _____________

Background Noise: Cicadas
Major Sources:_______________________________
Unusual Events:______________________________
Other Notes:_________________________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________ Date 9/18/12

State Project #:________ FI #:________ Federal Aid #________

Project Location:

GCP

Site Identification:

Cherokee Heights

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other____

Temperature____ Humidity____ Wind Speed____ Wind Direction____

Equipment: Sound Level Meter: Type: ________ Serial Number:____

Did you check the battery? Yes____ No____ Calibration Reading: Start____ End____

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)____

Calibrator: Type: ________ Serial Number: ____

Did you check the battery? Yes____ No____

Time Study Started: 11:44 Time Study Ended: 11:54

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 50.9 L10 ____ L50 ____ L90 ____ L95 ____ Other ____

Background Noise: Cicadas, Construction Noise

Major Sources:________

Unusual Events:________

Other Notes:________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________ Date 9/18/12

State Project #:________ FI #:________ Federal Aid #________

Project Location:

— GCP

Site Identification:

Cherokee Heights

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other____

Temperature____ Humidity____ Wind Speed____ Wind Direction____

Equipment: Sound Level Meter: Type: ________ Serial Number:____

Did you check the battery? Yes____ No____ Calibration Reading: Start____ End____

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)____

Calibrator: Type: ________ Serial Number: ____

Did you check the battery? Yes____ No____

Time Study Started: 11:55 Time Study Ended: 12:05

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 50.2 L10 ____ L50 ____ L90 ____ L95 ____ Other ____

Background Noise: Ambient, Cicadas

Major Sources:____

Unusual Events:____

Other Notes:____

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 7/18/12

State Project #:________________ FI #:________________ Federal Aid #________________

Project Location:

GCP

Site Identification:

US 231 @ Nchi Rd (100' from EOP)

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___

Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: ________________ Serial Number:______

Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___

Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)___

Calibrator: Type: ________________ Serial Number: ______

Did you check the battery? Yes___ No___

Time Study Started: 12:15 Time Study Ended:________________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ______ LEQ 59.2 L10 ______ L50 ______ L90 ______ L95 ______ Other ______

Background Noise:________________

Major Sources:________________

Unusual Events:________________

Other Notes:________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

30 ft East of Tram Rd EOP (Edge of Pavement)

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other______

Temperature____ Humidity______ Wind Speed____ Wind Direction_____

Equipment: Sound Level Meter: Type: ______________ Serial Number:______

Did you check the battery? Yes____No____ Calibration Reading: Start____End______

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________

Calibrator: Type: ______________ Serial Number: ______

Did you check the battery? Yes____ No____

Time Study Started: 2:30 PM Time Study Ended: 2:40

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 48.2 L10 _____ L50 _____ L90 _____ L95 _____ Other ______________

Background Noise: Ambient Cicades

Major Sources:______________

Unusual Events:______________

Other Notes:______________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By__________________________ Date 9/18/12

State Project #:__________ FI #:__________ Federal Aid #__________

Project Location:

GEP

Site Identification:

Tram Rd

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other__________

Temperature____ Humidity______ Wind Speed_____ Wind Direction_____

Equipment: Sound Level Meter: Type: __________ Serial Number:______

Did you check the battery? Yes___ No___ Calibration Reading: Start____ End______

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________

Calibrator: Type: __________ Serial Number: ______

Did you check the battery? Yes____ No____

Time Study Started: 2:41 Time Study Ended: 2:51

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ______ LEQ 49.2 L10 ______ L50 ______ L90 ______ L95 ______ Other __________

Background Noise:__________

Major Sources:__________

Unusual Events:__________

Other Notes:__________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

Tram Rd

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___________

Temperature___ Humidity_____ Wind Speed____ Wind Direction_____

Equipment: Sound Level Meter: Type: ______________________ Serial Number:_______

Did you check the battery? Yes___ No___ Calibration Reading: Start____ End______

Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)__________

Calibrator: Type: ______________________ Serial Number: _______

Did you check the battery? Yes____ No____

Time Study Started: 2:51 Time Study Ended: 3:01

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 48.5 L10 _____ L50 _____ L90 _____ L95 _____ Other ___________

Background Noise:______________________

Major Sources:______________________

Unusual Events:______________________

Other Notes:______________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

Tram Road

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other____________
Temperature____ Humidity______ Wind Speed_____ Wind Direction_____

Equipment: Sound Level Meter: Type: ______________________ Serial Number:_______
Did you check the battery? Yes____ No____ Calibration Reading: Start____ End_______
Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)____________
Calibrator: Type: ______________________ Serial Number: ________
Did you check the battery? Yes____ No____

Time Study Started: 3:02 ____________ Time Study Ended:________________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 48.1 L10 _____ L50 _____ L90 _____ L95 _____ Other ______________

Background Noise:______________________
Major Sources:______________________
Unusual Events:______________________
Other Notes:______________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By____________________ Date 9/18/12

State Project #:__________ FI #:__________ Federal Aid #__________

Project Location:

— GCP

Site Identification:

Tram Road

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other________

Temperature____ Humidity____ Wind Speed____ Wind Direction____

Equipment: Sound Level Meter: Type: ________________ Serial Number:______

Did you check the battery? Yes____ No____ Calibration Reading: Start____ End____

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)______

Calibrator: Type: ________________ Serial Number: ______

Did you check the battery? Yes____ No____

Time Study Started: 3:12 Time Study Ended: 3:22

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 47.9 L10 ____ L50 ____ L90 ____ L95 ____ Other ______

Background Noise: Ambient / Cicadas

Major Sources:__________

Unusual Events:__________

Other Notes:__________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

Tram Road

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___
Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: ______________ Serial Number:______
Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___
Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)______
Calibrator: Type: ______________ Serial Number: ______
Did you check the battery? Yes___ No___

Time Study Started: 3:25 Time Study Ended: 3:35

TRAFFIC DATA

Roadway Identification	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 48.0 L10 _____ L50 _____ L90 _____ L95 _____ Other _____

Background Noise: Cicadas

Major Sources:

Unusual Events:

Other Notes:

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

30 ft South of EOP on Bay Line Drive - Lee Road Area

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___

Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: ______________ Serial Number:______

Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___

Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)______

Calibrator: Type: ______________ Serial Number: ______

Did you check the battery? Yes___ No___

Time Study Started: 9:42 AM Time Study Ended:______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 46.0 L10 _____ L50 _____ L90 _____ L95 _____ Other __________

Background Noise: Manufacturing

Major Sources:______________

Unusual Events:______________

Other Notes:______________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________ Date 9/18/12

State Project #:__________ FI #:__________ Federal Aid #__________

Project Location:

GCP

Site Identification:

Bay Line Drive - Lee Road Area

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other______

Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: __________ Serial Number:______

Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___

Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)______

Calibrator: Type: __________ Serial Number: ______

Did you check the battery? Yes___ No___

Time Study Started: 9:55 __________ Time Study Ended: 10:05

TRAFFIC DATA

Roadway Identification	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 45.6 L10 _____ L50 _____ L90 _____ L95 _____ Other _______

Background Noise:__________

Major Sources:__________

Unusual Events:__________

Other Notes:__________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

Bay Line Drive

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other______

Temperature____ Humidity______ Wind Speed______ Wind Direction______

Equipment: Sound Level Meter: Type: ______________________ Serial Number:______

Did you check the battery? Yes____ No____ Calibration Reading: Start____ End______

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________

Calibrator: Type: ______________________ Serial Number: ________

Did you check the battery? Yes____ No____

Time Study Started: 10:05 Time Study Ended:______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 46.1 L10 _____ L50 _____ L90 _____ L95 _____ Other __________

Background Noise:______________________

Major Sources:______________________

Unusual Events:______________________

Other Notes:______________________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By__________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GCP

Site Identification:

Bag Line Drive

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other______

Temperature____ Humidity_____ Wind Speed____ Wind Direction_____

Equipment: Sound Level Meter: Type: ______________ Serial Number:______

Did you check the battery? Yes____No____ Calibration Reading: Start____End______

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)__________

Calibrator: Type: ______________ Serial Number: ______

Did you check the battery? Yes____ No____

Time Study Started: 10:15 Time Study Ended:______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 46.3 L10 _____ L50 _____ L90 _____ L95 _____ Other _______

Background Noise: Manufacturing, Correctional Facility

Major Sources:______________

Unusual Events:______________

Other Notes:______________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:__________ FI #:__________ Federal Aid #__________

Project Location:
GCD

Site Identification:
Bay Line Road

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other______
Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: __________ Serial Number:______
Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___
Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)______
Calibrator: Type: __________ Serial Number: ______
Did you check the battery? Yes___ No___

Time Study Started: 10:25 Time Study Ended:__________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 45.9 L10 ____ L50 ____ L90 ____ L95 ____ Other ______

Background Noise:__________
Major Sources:__________
Unusual Events:__________
Other Notes:__________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By_______________________________ Date 9/18/12

State Project #:______________ FI #:______________ Federal Aid #______________

Project Location:

GLP

Site Identification:

Bay Line Drive

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___________
Temperature___ Humidity_____ Wind Speed____ Wind Direction_____

Equipment: Sound Level Meter: Type: _______________________ Serial Number:______
Did you check the battery? Yes___ No___ Calibration Reading: Start____ End______
Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)__________
Calibrator: Type: _______________________ Serial Number: ______
Did you check the battery? Yes___ No___

Time Study Started: 10:35 Time Study Ended:______________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 46.1 L10 _____ L50 _____ L90 _____ L95 _____ Other __________

Background Noise:__________

Major Sources:__________

Unusual Events:__________

Other Notes:__________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:____________ FI #:____________ Federal Aid #____________

Project Location:

GCP

Site Identification:

US 231 near Camp Flowers Road (100' from EOP)

Weather Conditions: Sky: Clear___ Partly Cloudy___ Cloudy___ Other___

Temperature___ Humidity___ Wind Speed___ Wind Direction___

Equipment: Sound Level Meter: Type: ____________ Serial Number:______

Did you check the battery? Yes___ No___ Calibration Reading: Start___ End___

Response Settings: Fast___ Slow___ Weighting: A___ Other (identify)___

Calibrator: Type: ____________ Serial Number: ______

Did you check the battery? Yes___ No___

Time Study Started: 9:10 AM Time Study Ended:____________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX _____ LEQ 59.4 L10 _____ L50 _____ L90 _____ L95 _____ Other _____

Background Noise:____________

Major Sources:____________

Unusual Events:____________

Other Notes:____________

NOISE MEASUREMENT DATA SHEET

Measurements Taken By________________________ Date 9/18/12

State Project #:____________ FI #:____________ Federal Aid #____________

Project Location:

GLP

Site Identification:

US 231 @ Nchi Rd (100' from EOP)

Weather Conditions: Sky: Clear____ Partly Cloudy____ Cloudy____ Other________

Temperature____ Humidity____ Wind Speed____ Wind Direction____

Equipment: Sound Level Meter: Type: ____________ Serial Number:______

Did you check the battery? Yes____ No____ Calibration Reading: Start____ End____

Response Settings: Fast____ Slow____ Weighting: A____ Other (identify)______

Calibrator: Type: ____________ Serial Number: ______

Did you check the battery? Yes____ No____

Time Study Started: 12:38 Time Study Ended:____________

TRAFFIC DATA

Roadway Identification				
	Roadway 1		Roadway 2	
Vehicle Type	Volume	Speed	Volume	Speed
Autos				
Medium Trucks				
Heavy Trucks				
Motorcycles				
Buses				
Duration				

RESULTS

LMAX ____ LEQ 60.1 L10 ____ L50 ____ L90 ____ L95 ____ Other ________

Background Noise:____________

Major Sources:____________

Unusual Events:____________

Other Notes:____________